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REPORT

Natural Environment Report

Proposed CBM Dance Pit Expansion

Submitted to:

CBM Aggregates, a Division of St. Marys Cement Inc. (Canada)

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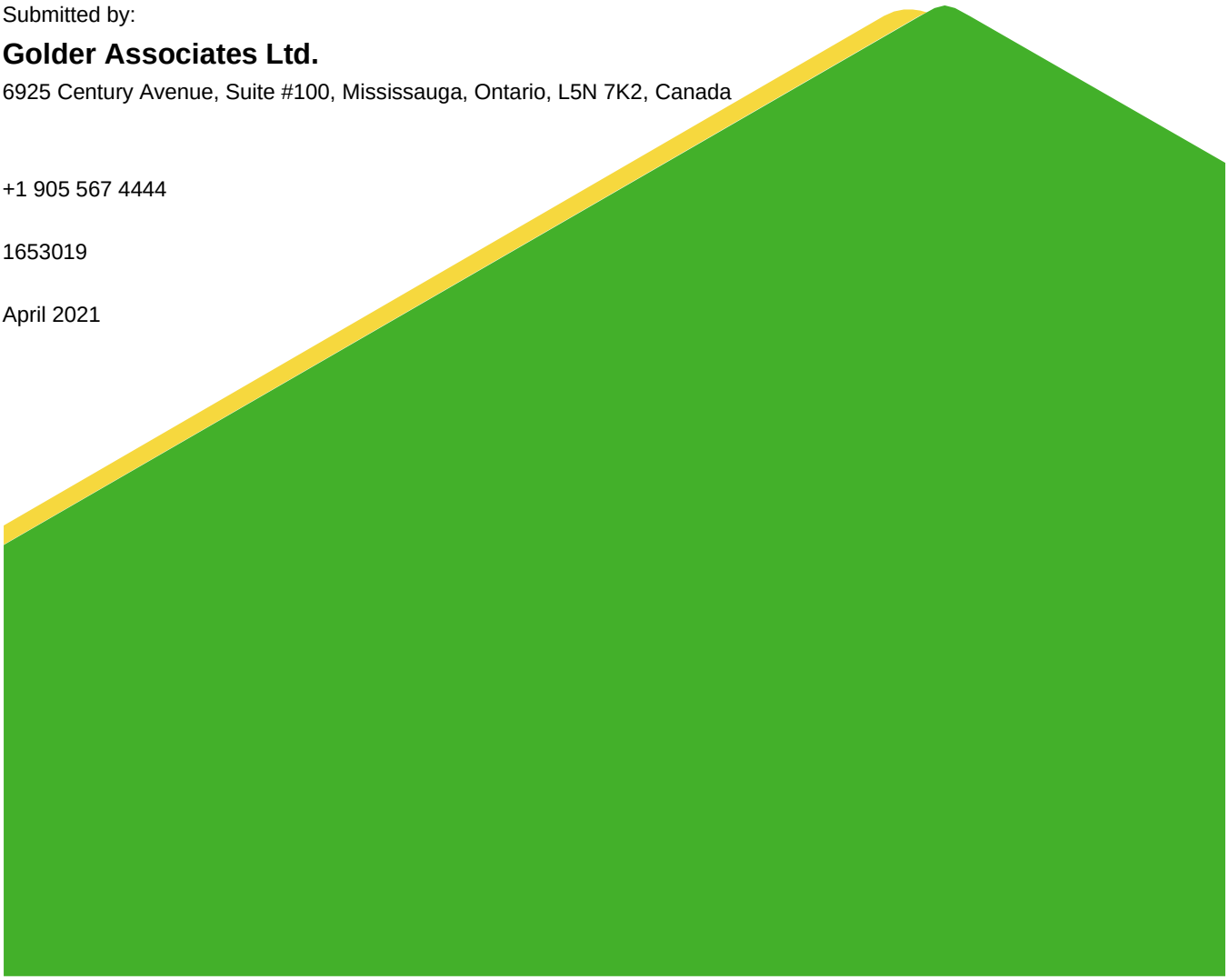

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1.0 INTRODUCTION

Golder Associates Ltd. (Golder) has been retained by CBM Aggregates (CBM), a division of St. Marys Cement Inc. (Canada) (SMC) to complete technical studies for the application of a Category 3, Class "A" licence Pit Above Water under the *Aggregate Resources Act* (ARA) associated with the proposed expansion of the existing CBM Dance Pit (MNRF Licence No. 17348) on Part of the North Half of Lots 14 and 15, Concession 10, Township of North Dumfries, Regional Municipality of Waterloo, Ontario (herein referred to as the Site or the Dance Pit Expansion; Figure 1).

1.1 Purpose

This report specifically addresses the requirements of a Natural Environment Technical Report (Aggregate Resources of Ontario Provincial Standards, Section 2.2) that will accompany the applications for a Category 3, Class "A" Pit Above Water. A Terms of Reference (ToR) was submitted to the Township of North Dumfries, Region of Waterloo, City of Cambridge, and Grand River Conservation Authority (GRCA). This report also meets the requirements of an Environmental Impact Statement (EIS) as per the ToR for these agencies, and provides the supporting information required to accompany the zoning change application to be submitted to the Township of North Dumfries.

For the purpose of this report, the following definitions are used:

Site (Figure 2) - the total land area within the property owned by CBM that is proposed for licensing under the ARA. The Site is 28.4 hectares (ha).

Extraction Limit (Figure 2) – The total area within the Site in which aggregate is proposed for extraction. The total area of the Extraction Limit is 21.2 ha. The Extraction Limit will be set back 30 metres (m) along the road to the north, 0 m along the property boundary to the south, 0 m boundary with the existing Dance Pit where it is proposed to integrate the existing operations, and a 60 m (or greater) setback along the eastern boundary adjacent to the subdivision where a doubling of the regulatory setback is proposed.

Study Area (Figure 2) - The Study Area for the NER assessment is defined in the Aggregate Resources of Ontario Provincial Standards, Section 2.2 as the Site and surrounding 120 m. Because there is no predicted groundwater drawdown, since it is an above water table application (Golder 2016), and there are no sensitive natural features beyond 120 m that have potential to be influenced by the proposed operation, the Study Area was kept to the Site and surrounding 120 m.

The purpose of this report is to assess potential environmental impacts of the proposed aggregate extraction on the Site with respect to the following:

- The environmental features and functions in the Study Area
- The influence of extraction on the surrounding natural environment
- The rehabilitation potential of the Site after extraction

1.2 Site Description

The Site is located on the south side of Cedar Creek Road in a semi-rural setting in the Township of North Dumfries, immediately west of the City of Cambridge. The Site is currently being actively farmed. The proposed licence area is approximately 28.4 ha and the proposed extraction area is approximately 21.2 ha.

1.2.1 Adjacent Land Use

There is a residential subdivision immediately east of the Site, within the City of Cambridge boundaries. There is a rural residence to the north, as well as some lands in agricultural use on the north side of Cedar Creek Road. North of the Site, to the north of Cedar Creek Road, is a provincially significant wetland (PSW) known as the Gilholm – Salisbury PSW. Angewood Park, a municipal park operated by the City of Cambridge, is immediately adjacent to the southeast corner of the Site. There are also active aggregate extraction sites to the northwest of the Site. The Dance Pit, immediately to the west of the Site (formerly known as the Cedar Street Pit), is owned by CBM, which purchased the property from Douglas and Donald Dance in 2016. The Dance Pit was licensed for aggregate extraction in 1992 (Category 3 Class A Licence [pit above water table] No. 17348) and extraction began in 1995. The existing pit encompasses an area of 44.95 ha with 41.33 ha approved for aggregate extraction.

2.0 ENVIRONMENTAL POLICY CONTEXT

The proposed Site is located in the Township of North Dumfries, Region of Waterloo. A portion of the Study Area is also within the City of Cambridge. Documents reviewed to gain an understanding of the natural heritage features and regulations that are relevant to the proposed Site and Study Area consisted of the following:

- The ARA (Ontario 1990) and the Aggregate Resources of Ontario Standards (MNRF 2020)
- The Provincial Policy Statement (MMAH 2020a)
- The *Endangered Species Act* (Ontario 2007)
- The *Species at Risk Act* (Canada 2002)
- The Growth Plan for the Greater Golden Horseshoe (MMAH 2020b)
- The Township of North Dumfries Official Plan (2018)
- The City of Cambridge Official Plan (2018)
- The Region of Waterloo Official Plan (2015)
- The Grand River Conservation Authority Reg. 150/06 Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses (2006)

An overview of the above noted legislation and policy documents are discussed in Sections 2.1 to 2.7.

2.1 Aggregate Resources Act

Applicants are required under the ARA Provincial Standards (MNRF 2020) to prepare a Natural Environment Report (NER). The NER is required to identify the designated natural heritage features and areas on, and within 120 m of the site, as defined in the Provincial Policy Statement (PPS) (MMAH 2020a) with guidance from supporting technical manuals prepared by the Ministry of Natural Resources and Forestry (MNRF) (MNR 2000; MNR 2010; MNRF 2014a; MNRF 2015). Where any of these features/areas have been identified, the report must identify and evaluate any negative impacts on the natural features/areas, including their ecological functions, and identify any proposed preventative, mitigative or remedial measures. The report must also identify if the site or

any of the features/areas are located within a natural heritage system that has been identified by a municipality in ecoregions 6E and 7E or by the province as part of a provincial plan.

2.2 Provincial Policy Statement

The PPS was issued under Section 3 of *The Planning Act* The natural heritage policies of the PPS (MMAH 2020a) indicate that:

- 2.1.1 Natural features and areas shall be protected for the long-term
- 2.1.2 The diversity and connectivity of natural features in an area, and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features
- 2.1.3 Natural heritage systems shall be identified in Ecoregions 6E and 7E, recognizing that natural heritage systems will vary in size and form in settlement areas, rural areas, and prime agricultural areas
- 2.1.4 Development and site alteration shall not be permitted in:
  - a) significant wetlands in Ecoregions 5E, 6E and 7E
  - b) significant coastal wetlands
- 2.1.5 Unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, development and site alteration shall not be permitted in:
  - a) significant wetlands in the Canadian Shield north of Ecoregions 5E, 6E and 7E
  - b) significant woodlands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)
  - c) significant valleylands in Ecoregions 6E and 7E (excluding islands in Lake Huron and the St. Marys River)
  - d) significant wildlife habitat
  - e) significant areas of natural and scientific interest
  - f) coastal wetlands in Ecoregions 5E, 6E and 7E that are not subject to policy 2.1.4(b).
- 2.1.6 Development and site alteration shall not be permitted in fish habitat except in accordance with provincial and federal requirements
- 2.1.7 Development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements
- 2.1.8 Development and site alteration shall not be permitted on adjacent lands to the natural heritage features and areas identified in policies 2.1.4, 2.1.5 and 2.1.6 unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated that there will be no negative impacts on the natural features or on their ecological functions.

2.3 Species at Risk

2.3.1 Species at Risk Act (SARA)

At a federal level, Species at Risk (SAR) designations for species occurring in Canada are initially determined by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC). If approved by the federal Minister of the Environment, species are added to the federal List of Wildlife Species at Risk (Government of Canada 2002). Species that are included on Schedule 1 as endangered or threatened are afforded protection of critical habitat on federal lands under the *Species at Risk Act* (SARA). On private or provincially-owned lands, only aquatic species listed as endangered, threatened, or extirpated and migratory birds are protected under SARA, unless ordered by the Governor in Council.

2.3.2 Endangered Species Act (ESA)

SAR designations for species in Ontario are initially determined by the Committee on the Status of Species at Risk in Ontario (COSSARO), and if approved by the provincial Minister of Environment, Conservation and Parks, species are added to the provincial *Endangered Species Act* (ESA) which came into effect June 30, 2008 (Ontario 2007). The legislation prohibits the killing or harming of species identified as endangered or threatened in the various schedules to the Act. The ESA also provides habitat protection to all species listed as threatened or endangered. The Species at Risk Ontario (SARO) list is contained in O. Reg. 230/08.

Subsection 9(1) of the ESA prohibits the killing, harming, or harassing of species identified as ‘endangered’ or ‘threatened’ in the various schedules to the Act. Subsection 10(1) (a) of the ESA states that *“No person shall damage or destroy the habitat of a species that is listed on the Species at Risk in Ontario* (*SARO*) *list as an endangered or threatened species”*.

General habitat protection is provided, by the ESA, to all threatened and endangered species. Species-specific habitat protection is only afforded to those species for which a habitat regulation has been prepared and passed into law as a regulation of the ESA. The ESA has a permitting process to allow alterations to protected species or their habitats as well as a registration process for certain activities and species.

2.4 Growth Plan for the Greater Golden Horseshoe

The Growth Plan for the Greater Golden Horseshoe was issued under *The Places to Grow Act* (MMAH 2020b). The Growth Plan is intended, in coordination with other provincial plans, to establish a unique land use planning framework for the Greater Golder Horseshoe that supports the achievement of complete communities, a thriving economy, clean and healthy environment and social equity. A Natural Heritage System (NHS) for the Greater Golder Horseshoe was developed and mapped under the Growth Plan to support planning for the protection of the region’s natural heritage and biodiversity. However, the NHS mapping does not apply until such time as the applicable upper or lower tier municipality implements it in their official plan. Until this time, Growth Plan policies relating to the NHS will apply to the natural heritage system as mapped in the official plans approved as of July 1, 2017.

Growth Plan policies require that new mineral aggregate operations within the NHS demonstrate how connectivity between key natural heritage and key hydrologic features will be maintained, how any key natural heritage and key hydrologic features that are lost can be replaced, how the water resource system will be protected and how rehabilitation requirements will be satisfied (Section 4.2.8 2(b)). New mineral aggregate operations are not permitted within significant wetlands, habitat of endangered or threatened species, or significant woodlands (with some exceptions for young plantations and early successional habitat) (Section 4.2.8 2(a)).

An application to expand an existing mineral aggregate operation may be permitted within the NHS, including within key natural heritage or key hydrologic features and associated vegetation protection zones, as long as the decision is consistent with PPS policies (MMAH 2020a) and rehabilitation requirements of the Growth Plan are satisfied.

The Site is not located within the natural heritage system (referred to as the Regional Greenland Network) as defined in the Regional Municipality of Waterloo (the Region) Official Plan (OP) (Waterloo 2015). The northeastern portion of the study area is located within the Regional Greenland Network. An assessment of significance and potential Project impacts for the natural heritage and/or hydrologic features contained within this area in accordance with PPS policies is provided in Sections 6.0 and 7.0.

2.5 Township of North Dumfries

The Site is designated as Agricultural on the Township of North Dumfries (the Township) OP Planned Township Structure Map (No. 2). It is also identified as “Prime Agricultural Area” on OP Map No. 7 and a “Mineral Aggregate Resource Area” on OP Map No. 8 (Dumfries 2018). There are no Environmental Features identified on the Site according to the Official Plan mapping.

The wetland off-Site, but in the Study Area, north of Cedar Creek Road is designated as an “Environmental Constraint Area” on Map 5B (Environmental Constraint Areas) and is identified as a Core Environmental Feature that is part of an Environmentally Sensitive Landscape on Map 5A (Greenlands Network) (Dumfries 2018). There is an area designated as Hazard Land on Map 5C (Hazard Lands) in the southeast corner of the Site.

Section 5 of the Official Plan outlines the Township’s policies for Natural Resource Management, including Agricultural Resources and Mineral Aggregate Resources. An amendment to the Township Official Plan is not required for the proposed pit.

The current zoning of the property is Z1 (Agriculture) and will have to be changed to Mineral Extraction Zone 14 (Z.14).

2.6 City of Cambridge

The Site and majority of the Study Area is located in North Dumfries, outside of the City of Cambridge (the City) limits, within the Protected Countryside land use designation, as defined by the Region, and is discussed further in Section 2.7. The eastern portion of the Study Area, composed of the residential subdivision east of the Site, is located within the City of Cambridge limits and is defined as a low/medium density residential land use area (Cambridge 2018).

A portion of the forest located northeast of the Site is designated as part of the Natural Open Space System and overlaps the Study Area. There are no restrictions to development or site alteration on lands adjacent to the Natural Open Space System (Cambridge 2018). The forest, as well as the wetland off-Site north of Cedar Creek Road, are also within the Blair-Betchtel-Cruickston Environmentally Sensitive Landscape, as defined by the Region (Cambridge 2018). According to Section 3.A.2 (6) of the City’s OP, where development or site alteration is proposed on lands contiguous to an Environmentally Sensitive Landscape, an Environmental Impact Statement (EIS) that addresses landscape-level impacts is required (Cambridge 2018).

According to Map 15 (Source Water Protection Areas) of the City’s OP, the Site and majority of the Study Area is within the WPSA-6 Wellhead Protection Area. The eastern portion of the Study Area (i.e., primarily the residential

subdivision) is within the WPSA-5 Wellhead Protection Area (Cambridge 2018). Policies relating to Source Water Protection Areas are provided in the Region's OP.

2.7 Region of Waterloo

The Site is location within the Regional Mineral Aggregate Resource Area and also designated as a Prime Agricultural Area. The Site is also located in an identified Source Water Protection Area.

There are no Regional Greenland features identified on the Site according to the Region's OP. However, the forest and wetland located off-Site, but within the Study Area, north of Cedar Creek Road, are designated as Core Features of the Regional Greenland Network and are also part of an Environmentally Sensitive Landscape (Waterloo 2015). According to Section 7.B.12 of the Region's OP, where development or site alteration is proposed on lands contiguous to an Environmentally Sensitive Landscape, an EIS that addresses landscape-level impacts is required (Waterloo 2015). Similarly, where development is proposed contiguous to a Core Feature, an EIS must demonstrate no adverse environmental impacts to core environmental features or functions will occur (Waterloo 2015).

The technical reports required to support an application for a mineral aggregate operation are outlined in Section 9.C of the Region's OP and include an impact assessment of the proposal as it relates to the following issues: noise, dust, hydrogeology (ground and surface water), transportation, environmental features and functions, and archaeology. The Region also requires the applicant to provide information on the estimated lifespan of the mineral aggregate operation, and to demonstrate how the final rehabilitation plan is consistent with the policies of the Official Plans (Sec. 9.C.3. (f)). An assessment of the cumulative impact that may result from the proposed operation will also be addressed as part of the required technical review (Sec. 9.C.3. (g)).

An Amendment to the Regional Official Plan is not required.

2.8 Grand River Conservation Authority (GRCA)

The Study Area is located within the jurisdiction of the GRCA. The Study Area is located in the Nith River watershed and the Cedar Creek subwatershed (GRCA 2016). Any development or activities proposed within the regulation limit as governed by Ontario Regulation 150/06 under the *Conservation Authorities Act* (2011) may require a permit.

3.0 DESCRIPTION OF PROPOSED DEVELOPMENT

There will be no increase in the combined tonnage shipped of 750,000 tonnes/year from both the Dance Pit Expansion and the existing Dance Pit. During operations, the proposed extraction will make use of the existing infrastructure, including the entrance, exit and haul route, of the existing Dance Pit west of the Site. Approximately 21.74 ha are proposed for extraction on the Site, with a setback of 30 m along Cedar Creek Road on the northern boundary of the property, 60 m on the eastern boundary, adjacent to the subdivision (Figure 2). Along the western boundary, adjacent to the existing Dance Pit, a setback of zero metres is proposed to integrate the operations. A setback of 0 m will be implemented along the southern property boundary adjacent to the neighbouring pit, except in an area with a larger setback is required based on the results of noise modelling (Figure 2). The proposed extraction limit is detailed on accompanying site plans (2021).

No buildings will be constructed on the Site, and there will be no fuel storage on the Site. Extraction will be occurring above the water table with the material ultimately being fully processed on the adjacent Dance Pit. Use

of on-site stripping and clean imported fill will be used to rehabilitate the Site to agricultural conditions, as necessary.

Further details on the physical resource conditions and proposed operation of the Dance Pit Expansion are provided in the accompanying Maximum Predicted Water Table Report (Golder 2021).

4.0 METHODS

4.1 Background Review

The investigation of existing conditions on the Site and in the Study Area included a background information search and literature review to gather data about the local area and provide context for the evaluation of the natural features.

As part of the background review, a number of resources were used to evaluate the existing conditions on the Site and in the Study Area including:

- Natural Heritage Information Centre (NHIC) database, maintained by the MNRF (NHIC 2016)
- Land Information Ontario (LIO) geospatial data (MNRF 2016a)
- Species at Risk Public Registry (ECCC 2021)
- Species at Risk in Ontario (SARO) List (MNRF 2021)
- Breeding Bird Atlas of Ontario (OBBA) (Cadman et al. 2007)
- Atlas of the Mammals of Ontario (Dobbyn 1994)
- Ontario Reptile and Amphibian Atlas (Ontario Nature 2016)
- Bat Conservation International (BCI) range maps (BCI 2016)
- Ontario Butterfly Atlas (Jones et al. 2016)
- Township of North Dumfries Official Plan (2008)
- City of Cambridge Official Plan (2018)
- Region of Waterloo Official Plan (2015)
- eBird species maps (eBird 2012)
- Draft Grand River Characterization Report (LESPRTT 2008)
- A Watershed Forest Plan for the Grand River (GRCA 2004)
- Water Quality in the Grand River Watershed (Loomer and Cooke 2011)
- Grand River Conservation Authority Watershed Information: Grand River Information Network (GRCA 2016)
- Aerial imagery

To develop an understanding of the drainage patterns, ecological communities and potential natural heritage features that may be affected by the proposed aggregate extraction, MNRF LIO data were used to create base layer mapping for the Study Area. A geographic query of the NHIC database was conducted to identify element occurrences of any natural heritage features, including wetlands, Areas of Natural and Scientific Interest (ANSI), life science sites, rare vegetation communities, rare, threatened, or endangered species, including those designated S1-S3 (extremely rare to rare-uncommon), and other natural heritage features within two km of the Site.

4.2 SAR Screening

SAR considered for this report include those species listed in the ESA and SARA. An assessment was conducted to determine which SAR had potential habitat in the Study Area**.** A screening of all SAR which have the potential to be found in the vicinity of the Study Area was conducted first as a desktop exercise using the sources listed in Section 4.1. Species with ranges overlapping the Study Area, or recent occurrence records in the vicinity, were screened by comparing their habitat requirements to habitat conditions in the Study Area.

The potential for the species to occur was determined through a probability of occurrence. A ranking of low indicates no suitable habitat availability for that species in the Study Area and no specimens identified. Moderate probability indicates more potential for the species to occur, as suitable habitat appeared to be present in the Study Area, but no occurrence of the species has been recorded. Alternatively, a moderate probability could indicate an observation of a species, but there is no suitable habitat on the Site or in the Study Area.
High potential indicates a known species record in the Study Area (including during field surveys or background data review) and good quality habitat is present.

Searches were conducted during field surveys for suitable habitats and signs of all SAR identified through the desktop screening. If the potential for the species to occur in the Study Area was moderate or high, the screening was refined based on field surveys (i.e., habitat assessment) and/or species-specific surveys. Any habitat identified during ground-truthing or other field surveys with potential to provide suitable conditions for additional SAR not already identified through the desktop screening was also assessed and recorded.

4.3 Field Surveys

The habitats and communities on the Site and in the Study Area, where access was possible, were characterized through field surveys. The following sections outline the methods used for each of the field surveys in the Study Area. During all surveys, area searches were conducted, and additional incidental wildlife, plant, and habitat observations were recorded. Searches were also conducted to document the presence or absence of suitable habitat, based on habitat preferences, for those species identified in the desktop SAR screening described above. The dates when all surveys were conducted are included in Table 1.

Table 1: Summary of Field Surveys Conducted in the Study Area in 2016

Date	Type of Survey
May 24	Breeding Bird Survey, and General Wildlife Survey
July 7	Breeding Bird Survey, General Wildlife Survey, and Ecological Land Classification
July 25	SAR Habitat Confirmation with MNRF
September 21	Tree Inventory

4.3.1 Plant Community Surveys and Botanical Inventory

Plant communities on the Site were first delineated at a desktop level using high-resolution aerial imagery, then ground-truthed in the field using the Ecological Land Classification (ELC) system for Southern Ontario (Lee et al. 1998). These inventories were carried out by systematically traversing the Site to ensure a thorough survey of species and communities. During the field surveys, information on plant community structure and composition, and soils was recorded in order to better define and refine the plant community polygons.

The botanical inventory included area searches in all naturally-occurring habitats on the Site, and in the Study Area, to the extent possible. The searches were conducted by systematically walking through all habitats on the Site, in a meandering fashion, generally paralleling the principal (long) axis of a natural area, where feasible, and ensuring that the full width of the area was examined. Lists of all plant species identified during all of the field surveys were compiled.

4.3.2 Tree Inventory

A tree inventory was completed along the eastern Site boundary and approximately five metres into the adjacent western edge of the residential parcels, and Angewood Park (Figure 2). All individual trees over five centimetres in diameter were measured at 1.4 m above ground level (diameter at breast height: DBH) and were assessed for approximate height, maturity, and general health (i.e., with a rating of good to poor). Trees located on private land were assessed from roadside or from the Site boundary to approximate their measurements. Trees inventoried on the Site were marked with an orange plastic, numbered tree tag.

4.3.3 Breeding Bird Survey

Breeding bird point count surveys for songbirds and other diurnal birds were conducted at five stations on the Site (Figure 2). Surveys followed protocols from the Canadian Breeding Bird Survey (Downes and Collins 2003), and the OBBA (Cadman et al. 2007). Point count stations were established in representative habitats on the Site and were spaced a minimum of 250 m apart. Surveys were conducted between 30 minutes before sunrise and 10:00 am to encompass the period of maximum bird song.

Each station consisted of a circle with a 100 m radius from the centre point (where the observer stands), and each point count was 10 minutes in duration, and was separated into survey windows of 0-3, 3-5, and 5-10 minutes. All birds seen or heard were noted on pre-printed datasheets and observations were made regarding sex, age, and notable behaviour, when possible. Birds heard or seen outside of the 100 m radius were also noted using methods from the OBBA, including estimated distance (where possible).

4.3.4 General Wildlife Survey

General wildlife surveys (visual encounter surveys) included track and sign surveys, area searches, and incidental observations, concurrent with other field surveys.

The full range of habitats across the Site were searched, with special attention paid to edge habitats and other areas where mammals might be active. Areas of exposed substrate such as sand or mud were located and examined for any visible tracks. Any wildlife (including mammals, butterflies, and dragonflies) seen and identified were recorded. When encountered, tracks and other signs (e.g., tracks, scats, hair, tree scrapes, etc.) were identified to a species, if possible, and recorded. Observations of wildlife species or signs during all field surveys were recorded.

Visual encounter surveys for turtles and snakes as well as turtle and snake habitat (with a focus on SAR) were conducted on Site. All suitable habitats for reptiles were searched (e.g., flipping logs and other types of cover objects, observations in piles of rocks) and all reptiles and amphibians observed were identified and recorded.

4.4 Analysis of Significance and Sensitivity and Impact Assessment

An assessment was conducted to determine if any significant environmental features, SAR, or other significant species exist, or have moderate or high potential to exist, in the Study Area and assess whether the development would negatively impact surrounding significant natural heritage features or SAR. Preventative, mitigative and remedial measures were considered in assessing the net effects of the proposed extraction operation on the surrounding ecosystem.

5.0 EXISTING CONDITIONS

5.1 Ecosystem Setting and Regional Context

The Study Area is located primarily in Ecoregion 7E (Lake Erie-Lake Ontario), which covers approximately 2% of southern Ontario. A small portion of the north end of the Site, and the northern portion of the Study Area, is located in Ecoregion 6E (Lake Simcoe – Rideau), which covers just over 6% of southern Ontario (Crins et al. 2009).

Ecoregion 7E, also known as the Carolinian Forest zone, is underlain by limestone bedrock and is generally flat. Most substrates are calcareous mineral materials dominated by Gray Brown Luvisols and Gleysols. Approximately 78% of Ecoregion 7E is used for cropland or pasture, and another 7% is developed. Deciduous and mixed forest covers just over 12% of the ecoregion (Crins et al. 2009).

Ecoregion 6E is underlain by bedrock of dolomite and limestone and is characterized by gently rolling surface terrain interspersed by drumlin fields and moraines. Soils are primarily mineral-based and dominated by Gray Brown Luvisols and Melanic Brunisols. The majority of the region is covered by cropland or pasture (57%), with 16% covered by forest and 4% covered by water (Crins et al. 2009).

The north half of the Site and Study Area is located in the Guelph Drumlin Field physiographic region, while the south half is located in the Horseshoe Moraines physiographic region. The Guelph Drumlin Field region is characterized by numerous hills and drumlins. Forests occupy the valleys between the drumlins, while swamps and floodplain occur in the lower elevations at the bottom of the drumlin slopes (Chapman and Putnam 1984). Soils in this region are dominated by stony till and gravel with a shallow overlay of loam (Chapman and Putnam 1984). The Horseshoe Moraines region has two distinct landforms consisting of kames (stony ridges) and sand and gravel terraces of valley floors. The Study Area is located in an old spillway with flat sand and gravel terraces and some undrained swamp areas. Dominant soils in this region include coarse, stony till (Chapman and Putnam 1984).

The Site and western and southern portions of the Study Area are located in the Nith River watershed. The northern tip of the Site (approximately the first 80 m south of Cedar Creek Road), and the northern and eastern portions of the Study Area, are in the Grand River watershed. Both watersheds are characterized by agricultural land uses, including crop production and livestock. The Grand River watershed is also highly urbanized (Loomer and Cooke 2011).

5.2 Hydrogeology

Topographic mapping for the proposed extraction indicates that the ground surface at the Site ranges in elevation from approximately 310 masl (metres above sea level) in the southeast portion of the Site, to 325 masl along parts of the western boundary of the Site. The surrounding topographic conditions range from flat to hummocky.

A shallow unconfined aquifer is present at ground surface overlying fine-grained material. The water levels tend to fluctuate seasonally and generally follow (with a lag) the precipitation trends. The depth to the water table, as measured in the monitoring wells on the Site (not including off-Site wells), has ranged from 11.17 mbgs (meters below ground surface) to 13.86 mbgs. The measured water levels appear to fluctuate seasonally and were highest in May 2017 and lowest in December 2016.

It is anticipated that the regional groundwater flow in the overburden aquifer flows to the southeast toward the Grand River. Based on the water levels measured in May 2017, the inferred water table across the Site is shown to slope in general from west to east with an east-northeast direction in the northern portion of the Site. Overall, the direction of horizontal groundwater flow in the overburden aquifer at the Dance Pit Expansion is inferred to be in an easterly direction.

A more detailed discussion of surface water resources is provided in a separate report, entitled Maximum Predicted Water Table Report (Golder 2021).

5.3 Surface Water Resources

There are no surface water features on the Site. Off-Site, but within the Study Area, there is an open water marsh that is part of the Gilholm – Salisbury PSW located approximately 80 m northeast of Cedar Creek Road (Figure 1). Devil's Creek, a tributary of the Grand River, is located approximately 480 m northeast of the Site.

Based on GRCA mapping (GRCA 2016), there are no regulated limits as defined under O. Reg. 150/06 that overlap the Site. However, regulated limits associated with Devil's Creek and Gilholm – Salisbury PSW are in the Study Area within 20 m of the northern Site boundary.

A more detailed discussion of surface water resources is provided in a separate report, entitled Maximum Predicted Water Table Report (Golder 2021).

5.4 Aquatic Habitat and Fish

There is no fish habitat on the Site. Off-Site, but within the Study Area, Gilholm – Salisbury PSW north of Cedar Creek Road may provide fish habitat. However, no fish were observed during field surveys.

Devil's Creek, northeast of the Study Area, is considered a coldwater stream and supports coldwater fish species such as brown trout (*Salmo trutta*) and brook trout (*Salvelinus fontinalis*) (Wright and Imhof 2001; LESPRTT 2008).

5.4.1 Significant and Sensitive Species

None of the fish species identified in the desktop SAR screening as having ranges which overlap the Study Area are known to occur in Devil's Creek or Gilholm – Salisbury PSW (Appendix A).

5.5 Vegetation

5.5.1 Regional Setting

The Study Area is located in the transitional zone between the Deciduous Forest and the Great Lakes – St. Lawrence Forest Regions and may exhibit elements of both regions.

The Deciduous Forest region is characterized by deciduous species, as well as Carolinian-specific species, such as black cherry (*Prunus serotina*), tulip-tree (*Liriodendron tulipifera*), black oak (*Quercus velutina*), cucumber tree (*Magnolia acuminata*), pin oak (*Quercus ellipsoidalis*) and pignut hickory (*Carya glabra*). The Great Lakes – St. Lawrence region contains a wide variety of both coniferous and deciduous species, including yellow birch (*Betula alleghaniensis*), white ash (*Fraxinus americana*), green ash (*Fraxinus pennsylvanica*), eastern hemlock (*Tsuga canadensis*), white pine (*Pinus strobus*) and balsam fir (*Abies balsamea*) (Rowe 1972).

Deciduous species common to both forest regions include sugar maple (*Acer saccharum*) and beech (*Fagus sylvatica*) in combination with basswood (*Tilia americana*), red maple (*Acer rubrum*), red oak (*Quercus rubra*), white oak (*Quercus alba*), and bur oak (*Quercus macrocarpa*). Bitternut hickory (*Carya cordiformis*), butternut (*Juglans cinerea*), rock elm (*Ulmus thomasii*), blue-beech (*Carpinus caroliniana*), and silver maple (*Acer saccharinum*) also occur across both forest regions (Rowe 1972).

Topography of the Deciduous Forest region is generally flat, while the Great Lakes – St. Lawrence Forest Region is more irregular, but generally flat and is underlain by limy glacial deposits (Rowe 1972).

5.5.2 Tree Inventory

A total of 132 trees were inventoried during the survey (Appendix B). Most of the trees were identified as common landscape and wasteland trees of exotic origin, or hybrids or cultivars of native stock. Most of the trees on the residential parcels east of the Site were planted and maintained (e.g., pruning, lawn maintenance) and as a result, were noted to be in good health. The inventoried trees are typical of the soils and terrain on the Site and in the Study Area, which generally consists of semi-open to open rolling upland with well drained mineral soils. The few trees identified in poor health showed evidence of advanced decline, likely the result of old age, as in the case of many of the white poplar (*Populus alba*) which is a short-lived species.

Many of the trees along the eastern Site boundary were in small clusters, likely as a result of planting (Appendix B, Table B1). Evidence that some of these trees originated from the dumping of garden waste containing landscape tree waste was also observed. Overall, these trees have sufficient light source because of their location at a field edge and they likely act as a shelterbelt to the residential parcels from the prevailing winds that are otherwise uninterrupted across the open agricultural field on the Site.

Trees inventoried in Angewood Park are primarily non-native trees (e.g., Manitoba maple [*Acer negundo*]) (Appendix B, Table B2). These trees provide sufficient structure and shelter for the recreational use at the woodland park but are considered trees of low quality as they are generally non-native, fast growing, and short lived, easily damaged by wind, of poor lumber value, outcompete other plant species, degrade soil productivity, and are of low preference for wildlife use.

Two trees located close to Angewood Park are native trees that are likely remnants of the original forest that existed prior to land development. One of these trees, a black cherry (*Prunus serotina*), was very mature and in good condition, although there was some evidence the increasing Manitoba maple encroachment may affect this species negatively in the near future. The other tree, a very mature red oak (*Quercus rubra*), was the largest and likely oldest tree surveyed as part of the tree inventory. The oak tree was in good condition, aside from low disturbance (i.e., old treehouse remnants likely from youth using Angewood Park) and is on the boundary between the Site and Angewood Park where it receives adequate light from the open agricultural field on Site.

5.5.3 Plant Communities

Overall, the Site is primarily composed of an open agricultural field, with small natural areas of meadow, woodland, and forest along the field edges.

During field surveys conducted on Site and in the Study Area, six plant communities were identified based on the ELC system (Lee et al. 1998) in addition to agricultural, residential, and disturbed areas related to the active pit. These communities are shown on Figure 2 and are briefly described in Table 2.

Table 2: Plant Communities on the Dance Pit Expansion Site and in the Study Area

Plant Community	Description	SRANK[a]
AGRICULTURAL		
OAGM1 Agricultural Row Crop - Annual	The majority of the land on the Site is planted in annual row crop agriculture. The field south of the Site, within the Study Area, is also annual row crop agriculture.	n/a
OAGM2 Perennial Cover Crop	An off-Site hay field associated with the farm north of Cedar Creek Road.	n/a
ANTHROPOGENIC		
CVR2 High Density Residential	A residential subdivision located in the Study Area east of the Site.	n/a
CVR4 Rural Residential	A small farm property north of Cedar Creek Road.	n/a
CVC4 Extraction Industry	Areas of existing aggregate extraction, located west and northwest of the Site.	n/a
TERRESTRIAL		
FOD2-4 Dry-Fresh Oak-Hardwood Deciduous Forest	This forest community is located in the southeast corner of the Study Area. The canopy was dominated by red oak (*Quercus rubra*). The canopy also contained Manitoba maple (*Acer negundo*), red maple (*Acer rubrum*), basswood (*Tilia americana*), black cherry (*Prunus serotina*) and eastern cottonwood (*Populus deltoides*). The understory contained alternate-leaved dogwood (*Cornus alternifolia*), red-berried elder (*Sambucus racemosa*), and European buckthorn (*Rhamnus cathartica*).	S5

Plant Community	Description	SRANK[a]
WOD1 Mineral Deciduous Woodland	This community occurs in two locations within the Study Area. The first woodland community is located off-Site, north of Cedar Creek Road. It was dominated by Manitoba maple, willow (*Salix* sp.), and black walnut (*Juglans nigra*) with an understory dominated by staghorn sumac (*Rhus typhina*) and European buckthorn. The woodland had a semi-open canopy. The second woodland community was a hedgerow stretching along the western Site boundary and was variably dominated by Manitoba maple, basswood, and sugar maple, interspersed with shrubs.	n/a
CUM1-1 Dry-Moist Old Field Meadow	This meadow community type occurs in two locations: at the south end of the Site and in the southeast corner of the Study Area. Both meadows had high forb to grass ratios and contained unvegetated patches of gravel substrate. Smooth brome (*Bromis inermis*), timothy (*Phleum pretense*), orchard grass (*Dactylis glomerata*) and reed canary grass (*Phalaris arundinaceae*) were the most common species observed. Fuller's teasel (*Dipsacus fullnorum*) was the dominant forb species observed, in association with alfalfa, bird vetch (*Vicia cracca*) wild carrot (*Daucus carota*) and red clover (*Trifolium pretense*). The meadow at the south end of the Site also contained an eco-element inclusion of willow mineral deciduous swamp.	n/a
CUW1-3 Black Walnut Cultural Woodland	This woodland community is located off-Site, north of Cedar Creek Drive, in the northeast corner of the Study Area. It consisted of a low density of young black walnut trees and included areas dominated by staghorn sumac.	n/a
WETLAND		
MAS3-1 Cattail Organic Shallow Marsh	This marsh community is located off-Site, in the northeast corner of the Study Area north of Cedar Creek Road. It is dominated by common cattail (*Typha latifolia*).	S5
AQUATIC		
SAF1 Floating-leaved Shallow Aquatic	This aquatic community is located off-Site, in the northeast corner of the Study Area north of Cedar Creek Road. It contained unidentified floating-leaved aquatic plants and was evaluated from the roadside only.	n/a

[a] SRANK is a provincial –level rank indicating the conservation status of a species or plant community and is assigned by the NHIC in Ontario (NHIC 2015). SRANKs are not legal designations but are used to prioritize protection efforts in the Province. SRANKs for plant communities in Ontario are defined in the Significant Wildlife Habitat Technical Guide (MNR 2000). Ranks 1-3 are considered extremely rare to uncommon in Ontario; Ranks 4 and 5 are considered to be common and widespread. n/a indicates a community that has not been ranked, which often applies to anthropogenic, culturally-influenced or high-level ELC communities (i.e., FOD).

In addition to these plant communities, a tree screen was planted along the eastern site boundary (approximately 10 m from boundary) to provide a barrier for the adjacent residential subdivision in 2018 and 2019. The screen consisted of several tree and shrub species, including red oak, white spruce (*Picea glauca*), white pine, white cedar (*Thuja occidentalis*), red maple, silver maple, nannyberry (*Viburnum lentago*), highbush cranberry (*Viburnum opulus*), red osier dogwood (*Cornus sericea*), smooth serviceberry (*Amelanchier laevis*) and choke cherry (*Prunus virginiana*).

5.5.4 Vascular Plants

A total of 64 vascular plant taxa were identified on the Site and in the Study Area during the field surveys (Appendix C). Generally, alien species were more dominant in the plant communities, with the overall plant list composed of approximately 30% native species and 61% alien. The remaining 9% of the plant list were unable to be identified to the species level due to hybridization, seasonal timing, or difficulty in species differentiation (i.e., hawthorns). The high ratio of alien to native species may be influenced by the agricultural and aggregate extraction activities in the Study Area, as well as the residential areas, which lead to high disturbance levels.

5.5.5 Significant and Sensitive Plant Species

The majority of plant species identified during the field surveys are secure and common in Ontario and globally (S5; G5) or are unranked alien species (SNA; GNR). One species, honey-locust (*Gleditsia triacanthos*), is designated S2? (imperiled) in the province. However, this specimen was observed along the eastern boundary of the site and is likely planted. This tree is also outside of the proposed extraction area. None of the plant species identified in the desktop SAR screening as having ranges which overlap the Study Area were found during the botanical, or other, field surveys (Appendix A).

5.6 Wildlife

5.6.1 Breeding Birds

At total of 29 bird species were recorded during breeding bird surveys conducted on the Site (Appendix D). The species observed are typical of the habitats found in southwestern Ontario. Species observed on the Site included those that are common in meadow and edge habitats, such as song sparrow (*Melospiza melodia*).

5.6.2 Other Wildlife

One bird species, belted kingfisher (*Megaceryle alcyon*), was observed during surveys, other than the breeding bird surveys on the Site. Wildlife observations were limited because the majority of the Site is covered with a soybean field, which does not provide suitable habitat conditions for many wildlife species.

5.6.3 Significant and Sensitive Wildlife Species

All of the wildlife species observed during the field surveys are provincially ranked S4 (apparently secure – uncommon, but not rare), S5 (secure – common, widespread, and abundant in the province), or SNA (not applicable – species is not a target for conservation).

Two bird species designated threatened (bank swallow [*Riparia riparia*] and bobolink [*Dolichonyx oryzivorus*]) and one species designated special concern (eastern wood-pewee [*Contopus virens*]) under the ESA were recorded on the Site during field surveys. However, there is no suitable breeding habitat for bobolink or eastern wood-pewee on the Site. Eastern wood-pewee was likely a late migrant, and bobolink was only observed flying over the Site. Bank swallow was observed to be using breeding habitat on the adjacent active pit and is carried forward to the assessment of significant natural heritage features (Section 6.0).

6.0 ASSESSMENT OF SIGNIFICANT NATURAL HERITAGE FEATURES

This section assesses the natural heritage features and functions (as outlined in Section 2.0) located within the Study Area. The following sources were used during the assessment of features:

- Natural Heritage Reference Manual (NHRM; MNR 2010)
- Significant Wildlife Habitat Technical Guide (SWHTG; MNR 2000)
- Significant Wildlife Habitat Mitigation Support Tool (SWHMiST; MNRF 2014)
- Significant Wildlife Habitat Criteria Schedules for Ecoregions 6E and 7E (MNRF 2015a; 2015b)

6.1 Habitat of Endangered or Threatened Species

General habitat protection is provided, by the ESA, to all threatened and endangered species. General habitat includes all areas that a species may depend on, either directly or indirectly, to carry out life processes, including feeding, reproduction and rearing, residence, migration, or overwintering. Species-specific habitat protection is only afforded to those species for which a habitat regulation has been prepared and passed into law as a regulation of the ESA.

Five endangered or threatened species were assessed to have potential to occur on the Site or in the Study Area (Appendix A), including bank swallow, little brown myotis (*Myotis lucifugus*), tri-colored bat (*Perimyotis subflavus*), northern myotis (*Myotis septentrionalis*), and Blanding's turtle (*Emydoidea blandingii*).

Bank Swallow

There is no bank swallow nesting habitat on the Site. A bank swallow colony was identified in the adjacent active Dance Pit. The closest bank swallow colony to the Site is approximately 30 m west of the fence along the western Site boundary (Figure 2). However, no individual bank swallow was observed entering or exiting the nest cavities of the colony during breeding bird surveys or incidentally during other surveys conducted on the Site.

According to the General Habitat Description (GHD) for bank swallow (MNRF 2016d), foraging habitat within 500 m of the outer edge of a breeding colony is protected and must be assessed for potential impacts due to development. Foraging habitat includes open areas where insects are found, including lakes, wetlands, grassland, and open agricultural fields (Falconer et al. 2016). The agricultural field on the Site is currently planted in row crop (currently soybean). Recent studies have indicated that row crop fields, including corn and soybean, are not preferred foraging areas (Falconer et al. 2016). There are additional areas of open agricultural fields off-Site to the south of the bank swallow colony to provide additional foraging habitat. Although outside the defined 500 m boundary, there are several large ponds west of the Site that are within 1000 m of the identified bank swallow colony. These ponds are likely to provide higher quality foraging habitat with a larger concentration of insects than the row crop habitat on the Site. Based on this analysis, the removal of low quality foraging habitat on the Site is unlikely to have a significant adverse impact on the availability of foraging habitat or foraging behaviour of bank swallow.

Aggregate sites are subject to O. Reg. 242/08, s. 23.14 – pits and quarries. This regulation allows activities to occur on operating aggregate extraction sites that may impact a threatened or endangered species (including bank swallow) with a number of conditions, including registering the activity with the MECP, minimizing adverse effects of extraction on the species, and preparing a mitigation plan.

Where aggregate operations can proceed without negatively impacting the bank swallow individual, nest, or habitat (i.e., harm can be avoided), the activity is not required to be registered with the MECP. For example, temporary obstructions such as intermittent traffic along haul roads within Category 2 habitat, or small scale changes in Category 3 habitat are permitted.

Mitigation measures to address potential bank swallow nesting on the Site during operations are provided in Section 8.2.

Little Brown Myotis, Northern Myotis and Tri-colored Bat

Little brown myotis and northern myotis, both designated endangered under both the ESA and the SARA, was assessed to have a low potential to occur on the Site, but a moderate potential to occur in the Study Area. Little brown myotis will roost in both natural and man-made structures. They require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. Northern myotis will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Both species may use caves or abandoned mines for hibernaculum, but high humidity and stable above freezing temperatures are required (ECCC 2018). The deciduous forest (FOD2-4) southeast of the Site, in the Study Area, and the Manitoba maple / willow inclusion in the meadow (CUM1-1) on Site were assessed to be of poor quality for bats. No cavities were observed during field surveys, and the majority of trees surveyed in the deciduous forest during the tree inventory were small (less than 15 cm DBH) and unlikely to provide suitable roosting habitat. Off-Site, but within the Study Area, the woodlands north of Cedar Creek Road (WOD1 and CUW1-3) may provide suitable roosting habitat (Figure 2). No off-Site trees are proposed to be removed and no impacts to groundwater beyond the Site boundaries or surface water regimes off-Site are expected as part of the proposed extraction. Because potential habitat in the Study Area will not be impacted, the proposed extraction will have no adverse effects on little brown myotis and northern mytois and no further analysis is warranted.

Tri-colored bat, designated endangered under both the ESA and the SARA, was assessed to have a low potential to occur on the Site, but a moderate potential to occur in the Study Area. Tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada. They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures (ECCC 2018). The deciduous forest (FOD2-4) off-Site, in the southeast corner of the Study Area, and the Manitoba maple / willow inclusion in the meadow (CUM1-1) on Site were assessed to be of poor quality for bats. The majority of the trees surveyed in the deciduous forest during the tree inventory were small (less than 15 cm DBH) and unlikely to provide preferred habitat conditions for roosting. Off-Site, but within the Study Area, the woodlands north of Cedar Creek Road (WOD1 and CUW1-3) may provide suitable roosting habitat (Figure 2). No off-Site trees are proposed to be removed and no impacts to groundwater beyond the Site boundaries, or surface water regimes off-Site are expected as part of the proposed extraction. Because potential habitat in the Study Area will not be impacted, the proposed extraction will have no adverse effects on tri-colored bat and no further analysis is warranted.

Blanding's Turtle

Blanding's turtle, designated threatened under both the ESA and the SARA, was assessed to have a low potential to occur on the Site and low to moderate potential to occur in the Study Area. Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing, or slow-moving water, rich nutrient levels, organic substrates, and abundant aquatic vegetation. They will use rivers but prefer slow-moving currents and are likely

only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel, and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2005). There is no aquatic habitat, and limited, low-quality nesting habitat, on the Site. Off-Site, but within the Study Area, the marsh (MAS3-1 and SAF1) north of Cedar Creek Road may provide suitable aquatic habitat. The marsh is part of the Gilholm – Salisbury PSW. Although suitable habitat was identified in the Study Area, there are no records of occurrence for Blanding's turtle in the PSW or in the Study Area, based on a review of NHIC data (NHIC 2016). Because there are no confirmed records, there is no regulated habitat for Blanding's turtle as defined by the GHD (MNRF 2013).

The nearest area of suitable nesting substrates to the marsh is the gravel shoulder of Cedar Creek Road. On the Site, there is limited, low quality nesting habitat in the northeast corner of the agricultural field. The majority of soils on the Site are clay based, but a small area of silty clay soil occurs in the northeast corner of the field. Preferred nesting substrates consist of loose materials, such as sand or gravel. No evidence of nesting, such as predated nests or digging marks, were observed on the Site during field surveys conducted in early July during the turtle nesting period. Additional areas of wetland habitat extend north and northwest of the PSW. Based on available imagery (MNRF 2016a), there appears to be areas of higher quality nesting habitat adjacent to these wetland areas that are likely easier to access than the Site.

There is no direct culvert or surface water connection between the PSW and the Site. In addition, Cedar Creek Road represents a significant barrier to wildlife movement between the PSW and the Site. The road is separated from the PSW by a densely vegetated bank approximately 8 m high and at a steep slope of 45 degrees. Cedar Creek Road is a busy two-lane highway that represents a major thoroughfare into Cambridge and is currently undergoing construction to four lanes. On the south side of Cedar Creek Road, there is a steep roadside berm separating the Site from the road. The berm measures approximately 4 m high and has a slope of approximately 45 degrees.

If Blanding's turtle were crossing the road from the PSW to access the substandard nesting habitat on the Site, it is likely that there would be mortality evidence from vehicle collisions, particularly during the nesting season (i.e., June to early July). No dead individuals were observed during field surveys to indicate that Blanding's turtle, or any other turtle species, are crossing the road to access nesting habitat on the Site.

No impacts to groundwater beyond the Site boundaries or surface water regimes off-Site are expected as part of the proposed extraction. Because potential aquatic habitat in the Study Area will not be adversely impacted, barriers to access currently exist between the marsh and the Site, and higher quality wetland and nesting habitat exists north and northwest of the marsh, it is unlikely that Blanding's turtle would be found on the Site. Because potential habitat in the Study Area will not be impacted, the proposed extraction will have no adverse effects on Blanding's turtle and no further analysis is warranted.

6.2 Significant Wetlands

Significant wetlands are areas identified as provincially significant by the MNRF using evaluation procedures established by the Province, as amended from time to time (MMAH 2020a). Wetlands are assessed based on a range of criteria, including biology, hydrology, societal value, and special features (MNRF 2016c).

The Gilholm – Salisbury PSW is located off-Site, but within the Study Area, immediately north of Cedar Creek Road (Figure 1). There is no surface water connection between the PSW and the Site. Proposed aggregate extraction will be limited to above the water table and there are no plans for the washing of aggregate on the Site.

There will be no groundwater drawdown in the overburden aquifer as a result of the proposed extraction. Also, since there will be no extraction below the water table and no alteration to drainage on the Site, interference with the function of potential groundwater-dependent natural environment features in the Study Area will not occur. No further analysis is warranted.

6.3 Fish Habitat

The proposed extraction on the Site will be above water, and there are no anticipated impacts to groundwater. In addition, no adverse effects to surface water resources in the Study Area are expected as a result of the proposed extraction. No further analysis is warranted.

6.4 Significant Woodlands

Woodlands can vary in their level of significance at the local, regional, and provincial levels. Significant woodlands are an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history (MMAH 2020a). These are to be identified using criteria established by the MNRF and are included in the Natural Heritage Reference Manual (NHRM) for Policy 2.3 of the PPS (MNR 2010).

The Township of North Dumfries defers to the Regional definition for significant woodlands (Dumfries 2018). The City of Cambridge (Cambridge 2018) and Region of Waterloo (Waterloo 2015) both identify significant woodlands in their OPs as woodlands that meet all three of the following criteria:

a) Greater than four ha (excluding any adjoining hedgerows)

b) Composed primarily of native tree species

c) Meets the criteria of a “woodland” as defined by the Regional Woodland Conservation By-Law

All of the woodlands on Site and in the Study Area are smaller than 4 ha and do not meet the City and Region’s size criteria.

The NHRM (MNRF 2010) identifies four key characteristics to be evaluated for determining significant woodlands in Ontario, including woodland size, ecological function (e.g., interior habitat or linkages), uncommon characteristics (e.g., rare plant community) and economic and societal functional value. Based on a forest cover of 20% in the overall Grand River watershed (GRCA 2004), none of the woodlands on the Site or in the Study Area meet the size criteria (i.e., 20 ha) to be considered significant under the NHRM.

Based on the assessment, there are no significant woodlands on the Site or in the Study Area. Further analysis is not warranted.

6.5 Significant Valleylands

Significant valleylands should be defined and designated by the planning authority. General guidelines for determining significance of these features are presented in the Natural Heritage Reference Manual (NHRM) for Policy 2.3 of the PPS (MNR 2010). Recommended criteria for designating significant valleylands under the PPS include prominence as a distinctive landform, degree of naturalness, importance of its ecological functions, restoration potential, and historical and cultural values.

There are no significant valleylands on the Site or in the Study Area. Further analysis is not warranted.

6.6 Significant Areas of Natural or Scientific Interest (ANSIs)

Significant ANSIs are areas identified as provincially significant by the MNRF using evaluation procedures established by the Province, as amended from time to time.

There are no ANSIs on the Site or in the Study Area. Further analysis is not warranted.

6.7 Significant Wildlife Habitat

Significant wildlife habitat (SWH) is one of the more complicated natural heritage features to identify and evaluate. The NHRM includes criteria and guidelines for designating SWH. There are two other documents, the Significant Wildlife Habitat Technical Guide (SWHTG) and the Significant Wildlife Habitat Mitigation Support Tool (SWHMiST) (MNR 2000 and MNRF 2014), that can be used to help decide what areas and features should be considered significant wildlife habitat. These documents were used as reference material for this study.

There are four general types of significant wildlife habitat: seasonal concentration areas, migration corridors, rare or specialized habitats, and species of conservation concern. The specific habitats considered in this report are evaluated based on the criteria outlined in the Ecoregion 6E and 7E Criterion Schedules (MNRF 2015a; 2015b). All types of SWH are discussed below in relation to the Site and the proposed extraction.

6.7.1 Seasonal Concentration Areas

Seasonal concentration areas are those areas where large numbers of a species congregate at one particular time of the year. Examples include deer yards, amphibian breeding habitat, bird nesting colonies, bat hibernacula, raptor roosts, and passerine migration concentrations. If a SAR, or if a large proportion of the population may be lost if significant portions of the habitat are altered, all examples of certain seasonal concentration areas may be designated.

The SWHTG (MNR 2000) and Ecoregion 6E and 7E Criterion Schedules (MNRF 2015a; 2015b) identifies the following 12 types of seasonal concentrations of animals that may be considered significant wildlife habitat:

- winter deer yards and congregation areas
- colonial bird nesting sites
- waterfowl stopover and staging areas
- shorebird migratory stopover areas
- landbird migratory stopover areas
- raptor winter feeding and roosting areas
- reptile hibernacula
- turtle wintering areas
- bat hibernacula
- bat maternity colonies
- bat migratory stopover areas (6E only)

- migratory butterfly stopover areas

There are no large, non-agricultural open fields in the Study Area to provide terrestrial waterfowl stopover or staging areas. No shorebird migratory stopover areas were identified in the Study Area during field surveys. There are no large areas of forest with adjacent meadow habitat in the Study Area to support raptor wintering areas. No exposed bedrock or rock piles that extend below the frost line that would support bat or reptile hibernacula were identified in the Study Area during field surveys. No colonial bird nesting sites were identified in the Study Area during field surveys. There are no designated deer winter yards or winter congregation areas on the Site or in the Study Area. Because the Study Area is further than 5 km from Lake Ontario, migratory butterfly stopover areas and landbird migratory stopover areas are not applicable. The marsh north of Cedar Creek Road is likely too small to support significant numbers (i.e., >100) of waterfowl and does not provide aquatic waterfowl stopover or staging areas.

No large diameter trees, snags, or cavity trees were observed on the Site during the field surveys to provide bat maternity colony habitat. Although the deciduous woodland (WOD1) off-Site north of Cedar Creek Road may contain suitable, large diameter cavity trees to support bat maternity colonies, no tree removal is proposed outside of the Site boundary, and there will be no adverse effects on bat maternity colony SWH, if present in the Study Area.

The shallow marsh (MAS3-1 and SAF-1) off-Site on the north side of Cedar Creek Road, which is part of the Gilholm-Salisbury PSW, may provide suitable aquatic habitat for overwintering turtles. The proposed extraction will be above the water table and no groundwater impacts are expected. In addition, no adverse effects to surface water resources in the Study Area are expected as a result of the proposed extraction, and no impact to the wetland conditions of the marsh are anticipated. Because there will be no alteration to, or removal of, the marsh habitat, turtle overwintering habitat SWH is not carried forward.

6.7.2 Migration Corridors

The SWHTG (MNR 2000) defines animal movement corridors as elongated, naturally vegetated parts of the landscape used by animals to move from one habitat to another. This is generally in response to different seasonal habitat requirements. For example, trails used by deer to move to wintering areas or areas used by amphibians between breeding and summer habitat. To qualify as significant wildlife habitat, these corridors would be a critical link between habitats that are regularly used by wildlife.

Although a designated deer wintering area (Stratum 2) is located approximately 1.8 km south of the Site, outside the Study Area, there is no corridor connection between the wintering area and the Site. The land between the Site and the wintering area is primarily open agricultural field.

A second designated deer wintering area (Stratum 2) is located approximately 1.5 km northeast of the Site. The riparian corridor and valleyland associated with Devil's Creek may act as a migration or movement corridor for deer between the wintering area and the off-Site marsh north of Cedar Creek Road. No disturbance or habitat removal from the candidate migration corridor is expected. In addition, no groundwater or significant surface water impacts are expected that would adversely affect the form or function of the Devil's Creek valleyland.

A sparse, discontinuous hedgerow extends southwards from the deciduous forest (FOD2-4) in the southeast corner of the Site and connects to another deciduous forest approximately 350 m south of the Site. The hedgerow is narrow and was not assessed to provide significant cover for movement of deer or other small mammals. The

hedgerow also does not connect any aquatic features and is unlikely to function as a movement corridor for amphibians.

Because no adverse impacts on migration corridors are expected, no further analysis is warranted.

6.7.3 Specialized Habitats

Specialized habitats are microhabitats that provide a critical resource to some groups of wildlife. Examples include salt licks for ungulates and groundwater seeps for wild turkeys.

The SWHTG (MNR 2000) and Ecoregion 6E and 7E Criterion Schedules (MNRF 2015a; 2015b) defines seven specialized habitats that may be considered SWH. They are:

- habitat for area-sensitive species
- amphibian breeding habitat (woodlands and wetlands)
- turtle nesting habitat
- specialized raptor nesting habitat
- waterfowl nesting areas
- bald eagle and osprey habitat
- seeps and springs

There are no areas of large forest with interior habitat on the Site or in the Study Area to support area-sensitive species or specialized raptor nesting habitat. No seeps or springs were identified on the Site or in the Study Area during field surveys. No bald eagle or osprey individuals, and no nests, were observed during field surveys.

There is limited, low quality turtle nesting habitat on the Site. The majority of the Site is composed of clay soils that are unsuitable for nesting. There is a small area of loose soil in the northeast corner of the agricultural field on the Site. However, no evidence of nesting behaviour (e.g., predated nests) was observed during field surveys to indicate turtles are using the Site for nesting. In addition, the closest suitable aquatic habitat for turtles is in the off-Site marsh (MAS3-1 and SAF1), which is part of the Gilholm-Salisbury PSW, north of Cedar Creek Road. Cedar Creek Road represents a significant barrier to wildlife movement between the marsh and the Site. The road is separated from the marsh by a densely vegetated bank approximately 8 m high and at a steep slope of 45 degrees. Cedar Creek Road is a busy two-lane highway that represents a major thoroughfare into Cambridge and is currently undergoing construction to four lanes. On the south side of Cedar Creek Road, there is a steep roadside berm separating the Site from the road. The berm measures approximately 4 m high and has a slope of approximately 45 degrees. Higher quality nesting habitat occurs west of the marsh and access to this area is likely easier and less dangerous than accessing the Site. Because potential turtle nesting habitat on the Site is limited and of low quality, and larger areas of more suitable substrates occur west of the marsh, the Site is not considered to provide significant turtle nesting habitat. This assessment was also discussed with, and agreed to by, the MNRF during the site walk conducted on July 25, 2016. No further analysis is warranted.

There is no amphibian breeding habitat on the Site. The off-Site marsh (MAS3-1 and SAF1) north of Cedar Creek Road, which is part of the Gilholm-Salisbury PSW, may provide suitable wetland amphibian breeding habitat and waterfowl nesting habitat. The proposed extraction will be above the water table and no groundwater impacts are expected. In addition, no adverse effects to surface water resources in the Study Area are expected as a result of the proposed extraction, and no impact to the wetland conditions of the marsh are anticipated. Because there will be no alteration to, or removal of, the marsh habitat, there will be no adverse effects on amphibian breeding habitat and waterfowl nesting SWH, if present in the Study Area and no further analysis is warranted.

6.7.4 Rare Habitat

This category includes vegetation communities that are considered rare in the province. Generally, communities assigned an SRANK of S1 to S3 (extremely rare to rare-uncommon) by the NHIC could qualify. It is assumed that these habitats are at risk and that they are also more likely to support rare species and other features that are considered significant.

No rare vegetation communities were identified on the Site or in the Study Area during the field surveys. No further analysis is warranted.

6.7.5 Habitat for Species of Conservation Concern

Species that are considered SOCC include three groups of species:

- Species that are rare, those whose populations are significantly declining, or have a high percentage of their global population in Ontario
- Species listed as special concern under the ESA
- Species listed as threatened or endangered under SARA

Rare species are considered at five levels: globally rare, nationally rare, provincially rare, regionally rare, and locally rare (i.e., in the municipality). This is also the order of priority that should be attached to the importance of maintaining species. Some species have been identified as being susceptible to certain practices, and their presence may result in an area being designated significant wildlife habitat. Examples include species vulnerable to forest fragmentation and species such as woodland raptors that may be vulnerable to forest management or human disturbance. The final group of species of conservation concern includes species that have a high proportion of their global population in Ontario. Although they may be common in Ontario, they are found in low numbers in other jurisdictions.

The SWHTG (MNR 2000) and Ecoregion 6E and 7E Criterion Schedule (MNRF 2015a; 2015b) defines five specialized habitats for SOCC that may be considered SWH. They are:

- marsh bird breeding habitat
- open country bird breeding habitat
- shrub/early successional bird breeding habitat
- terrestrial crayfish
- special concern and rare wildlife species

No open country or shrub/early successional bird breeding habitat were identified on the Site or in the Study Area during field surveys. No suitable habitat for terrestrial crayfish was identified on the Site during the field surveys. The marsh (MAS3-1) off-Site north of Cedar Creek Road, which is part of the Gilholm-Salisbury PSW, may provide suitable habitat. The proposed extraction will be above the water table and no groundwater impacts are expected. In addition, no adverse effects to surface water resources in the Study Area are expected as a result of the proposed extraction, and no impact to the wetland conditions of the marsh are anticipated. Because there will be no alteration to, or removal of, the marsh habitat, there will be no adverse effects on terrestrial crayfish SWH present in the Study Area and no further analysis is warranted.

The marsh (MAS3-1 and SAF1) off-Site north of Cedar Creek Road, which is part of the Gilholm-Salisbury PSW, may provide suitable marsh bird breeding habitat. The proposed extraction will be above the water table and no groundwater impacts are expected. In addition, no adverse effects to surface water resources in the Study Area are expected as a result of the proposed extraction, and no impact to the wetland conditions of the marsh are anticipated. Because there will be no alteration to, or removal of, the marsh habitat, there will be no adverse effects on marsh bird breeding SWH, if present in the Study Area and no further analysis is warranted.

Seven SOCC were assessed to have potential to occur on the Site or in the Study Area (Appendix A), including monarch (*Danaus plexippus*), eastern ribbonsnake (*Thamnophis sauritius*), snapping turtle (*Chelydra serpentina*), downy yellow false foxglove (*Aureolaria virginica*), hairy-fruited sedge (*Carex trichocarpa*), northern pin oak (*Quercus ellipsoidalis*), and woodland flax (*Linum virginianum*).

Monarch

Monarch, designated special concern under both the ESA and the SARA, was assessed to have a moderate potential to occur on the Site and in the Study Area. Monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (*Asclepius* spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies, and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010). The edges of the agricultural field on the Site may provide suitable foraging habitat for this species (Figure 2). There is abundant similar habitat with nectaring flowers in the surrounding region maintained in edge habitats to support monarch. In addition, because habitat on Site is limited to edge habitat, the Site is unlikely to support a large population of monarch. Because habitat for this species is not limiting in the area, and the habitat on Site is not likely significant for monarch, monarch is not considered further, and no additional analysis is warranted.

Eastern Ribbonsnake

Eastern ribbonsnake, designated special concern under both the ESA and the SARA, was assessed to have low potential to occur on the site, but a moderate to high potential to occur in the Study Area. Eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams, or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012). There is no aquatic or wetland habitat on the Site and no potential suitable habitat. Off-Site, within the Study Area, the marsh (MAS3-1 and SAF1) north of Cedar Creek Road, which is part of the Gilholm-Salisbury PSW, may provide suitable habitat for ribbonsnake (Figure 2). In addition, there are recent occurrence records for this species in the vicinity of the Study Area. The proposed extraction will be above the water table and no groundwater impacts are expected. In addition, no adverse effects to surface water resources in the Study Area are expected as a result of the proposed extraction, and no impact

to the wetland conditions of the marsh are anticipated. Because there will be no alteration to, or removal of, the marsh habitat, eastern ribbonsnake is not considered further and no additional analysis is warranted.

Snapping Turtle

Snapping turtle, designated special concern under both the ESA and the SARA, was assessed to have a moderate to high potential to occur in the Study Area. Snapping turtle utilizes a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates, and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008). There is no aquatic habitat, and limited, low-quality nesting habitat on the Site. Off-Site, and within the Study Area, the marsh (MAS3-1 and SAF1) north of Cedar Creek Road, which is part of the Gilholm-Salisbury PSW, may provide suitable aquatic habitat (Figure 2). The marsh is part of the Gilholm – Salisbury PSW. In addition, there are recent occurrence records for snapping turtle in the vicinity of the Study Area. Snapping turtle is a special concern species and does not receive habitat protection under the ESA.

The nearest area of suitable nesting substrates to the marsh is the gravel shoulder of Cedar Creek Road. On the Site, there is limited, low quality nesting habitat in the northeast corner of the agricultural field. The majority of soils on the Site are clay based, but a small area of silty clay soil occurs in the northeast corner of the field. Preferred nesting substrates consist of loose materials, such as sand or gravel. No evidence of nesting, such as predated nests or digging marks, were observed on the Site during field surveys conducted in early July during the turtle nesting period. Additional areas of wetland habitat extend north and northwest of the PSW. Based on available imagery (MNRF 2016a), there appears to be areas of higher quality nesting habitat adjacent to these wetland areas that are likely easier to access than the Site.

There is no direct culvert or surface water connection between the PSW and the Site. In addition, Cedar Creek Road represents a significant barrier to wildlife movement between the PSW and the Site. The road is separated from the PSW by a densely vegetated bank approximately 8 m high and at a steep slope of 45 degrees. Cedar Creek Road is a busy two-lane highway that represents a major thoroughfare into Cambridge and is currently undergoing construction to four lanes. On the south side of Cedar Creek Road, there is a steep roadside berm separating the Site from the road. The berm measures approximately 4 m high and has a slope of approximately 45 degrees.

If snapping turtle were crossing the road from the PSW to access the substandard nesting habitat on the Site, it is likely that there would be mortality evidence from vehicle collisions, particularly during the nesting season (i.e., June to early July). No dead individuals were observed during field surveys to indicate that snapping turtle, are crossing the road to access nesting habitat on the Site.

No impacts to groundwater beyond the Site boundaries or surface water regimes off-Site are expected as part of the proposed extraction. Because potential aquatic habitat in the Study Area will not be adversely impacted, barriers to access currently exist between the marsh and the Site, and higher quality wetland and nesting habitat exists north and northwest of the marsh, it is unlikely that snapping turtle would be found on the Site. Because potential habitat in the Study Area will not be impacted, the proposed extraction will have no adverse effects on snapping turtle and no further analysis is warranted.

Downy Yellow False Foxglove

Downy yellow false foxglove has a provincial ranking of S1 (critically imperiled), and was assessed to have a low potential to occur on the Site, but a low to moderate potential to occur in the Study Area. This plant occurs in dry, open oak woods and savannahs in sandy soils. It is often associated with oak, pine, or hickory

(Reznicek et al. 2011). Although the oak-hardwood mixed forest (FOD2-4) in the southeast corner of the Site may provide suitable habitat, no individuals were recorded during field surveys. This plant may also grow in the deciduous woodland (WOD1) or mixed forest (FOM1) off-Site north of Cedar Creek Road (Figure 2). No impacts to the deciduous woodland or mixed forest north of the Site are expected as a result of the proposed extraction and downy yellow false foxglove is not considered further, and no additional analysis is warranted.

Hairy-fruited Sedge

Hairy-fruited sedge has a provincial ranking of S3 (vulnerable), and was assessed to have a low potential to occur on the Site, but a moderate potential to occur in the Study Area. This plant grows in extensive colonies in wet, deciduous forests on floodplains and riverbanks, as well as in floodplain marshes and meadows (Reznicek et al. 2011). There is no aquatic or wetland habitat on the Site and there is no potential suitable habitat. Off-Site, and within the Study Area, suitable habitat may occur along the marsh (MAS3-1 and SAF1) shoreline north of Cedar Creek Road, which is part of the Gilholm-Salisbury PSW (Figure 2). The proposed extraction will be above the water table and no groundwater impacts are expected. In addition, no adverse effects to surface water resources in the Study Area are expected as a result of the proposed extraction, and no impact to the wetland conditions of the marsh are anticipated. Because there will be no alteration to, or removal of, the marsh habitat, hairy-fruited sedge is not considered further, and no additional analysis is warranted.

Northern Pin Oak

Northern pin oak has a provincial ranking of S3 (vulnerable), and was assessed to have a low potential to occur on the Site, but a moderate potential to occur in the Study Area. This tree grows in dry, sandy, or rocky woods in association with other upland oaks and jack pine (Reznicek et al. 2011). Although the oak-hardwood mixed forest (FOD2-4) in the southeast corner of the Site may provide suitable habitat, no individuals were recorded during field surveys. This plant may also grow in the deciduous woodland (WOD1) or mixed forest (FOM1) off-Site north of Cedar Creek Road (Figure 2). No impacts to the deciduous woodland or mixed forest north of the Site are expected as a result of the proposed extraction and northern pin oak is not considered further, and no additional analysis is warranted.

Woodland Flax

Woodland flax has a provincial ranking of S2 (imperiled) and was assessed to have a low potential to occur on the Site, but a moderate potential to occur in the Study Area. This plant grows in open oak forest, upland woods, and dry to mesic lakeside and riparian forests (MSU 2007). Although the oak-hardwood mixed forest (FOD2-4) in the southeast corner of the Site may provide suitable habitat, no individuals were recorded during field surveys. This plant may also grow in the deciduous woodland (WOD1) or mixed forest (FOM1) off-Site north of Cedar Creek Road (Figure 2). No impacts to the deciduous woodland or mixed forest north of the Site are expected as a result of the proposed extraction and woodland flax is not considered further, and no additional analysis is warranted.

7.0 IMPACT ANALYSIS

The project was assessed for potential direct and indirect effects on the natural environment. No significant natural heritage features occur on the Site or in the Study Area that have potential to be adversely impacted by the proposed extraction on the Dance Pit Expansion.

8.0 REHABILITATION / MITIGATION / MONITORING

8.1 Rehabilitation Concept

The primary rehabilitation objective is to restore the maximum amount of land possible for agricultural capability. Soil will be imported to the Site, if necessary, to facilitate agricultural rehabilitation. The final rehabilitation plan is included in the accompanying site plans (2021.

8.2 Monitoring

Groundwater level monitoring, as recommended in the Maximum Predicted Water Table Report (Golder 2021), will be implemented for the proposed extraction. No monitoring specific to the natural environment is recommended.

9.0 SUMMARY AND RECOMMENDATIONS

The proposed Dance Pit Expansion has been assessed for potential ecological impacts under the ARA Provincial Standards, the Provincial Policy Statement, policies of the Township of North Dumfries, City of Cambridge, and Region of Waterloo, as well as other relevant legislation, including the ESA.

Based on these analyses, it is expected that there will be no negative impacts to the significant natural features and functions in the Study Area. These conclusions are based on the following recommendations:

- Groundwater level monitoring, as described in the Maximum Predicted Water Table Report (Golder 2021), will be implemented; and,
- The Site will be rehabilitated in accordance with the requirements of the rehabilitation plan, returning the Site primarily to agricultural use.

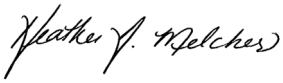
10.0 CLOSURE

We trust this report meets your current needs. If you have any further questions regarding this report, please contact the undersigned. Curriculum Vitae are provided in Appendix E.

Signature Page

Golder Associates Ltd.

Amber Sabourin, HBSc (Env)
Ecologist



Heather Melcher, MSc
Principal, Senior Ecologist

AVS/HM/ff

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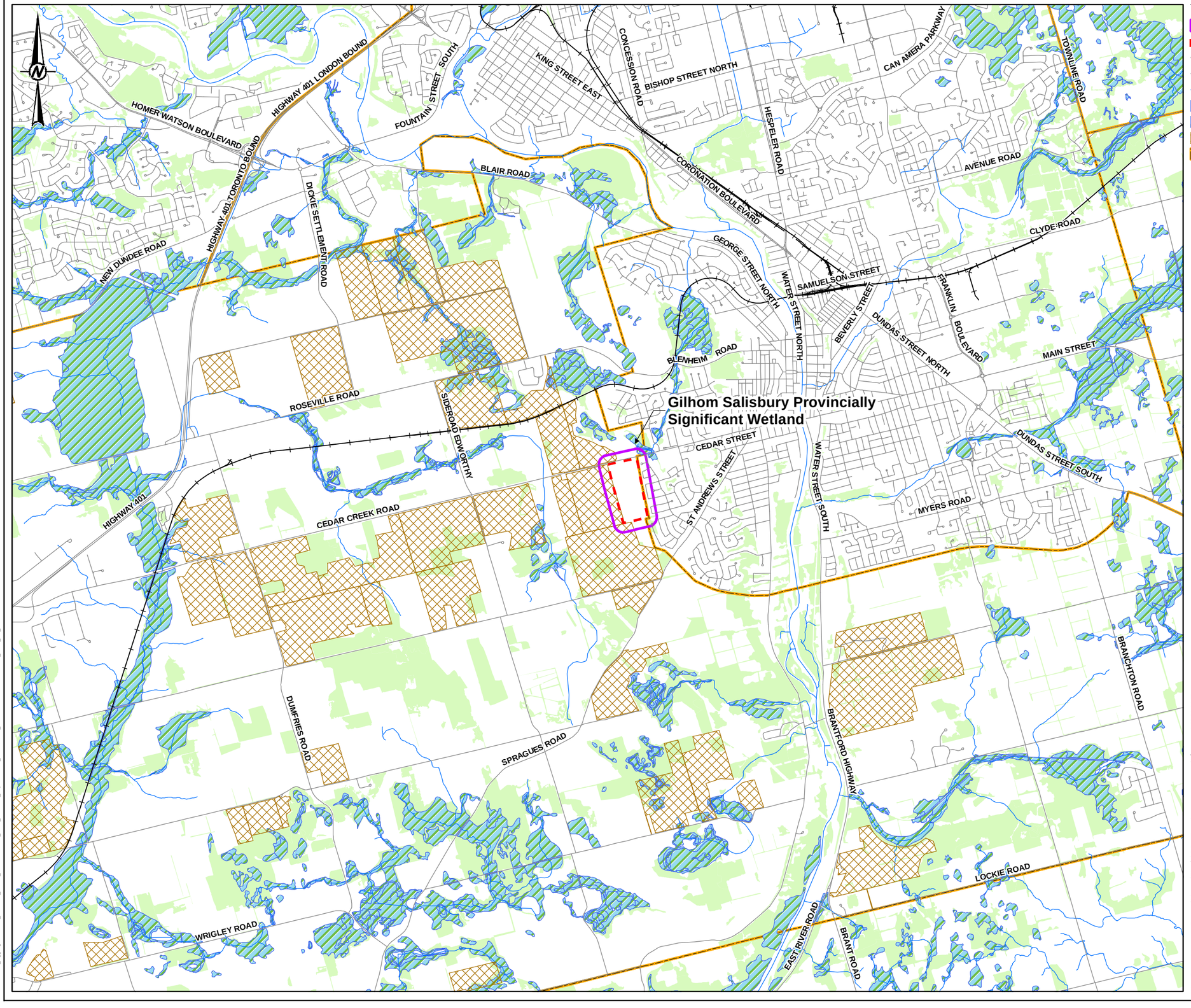
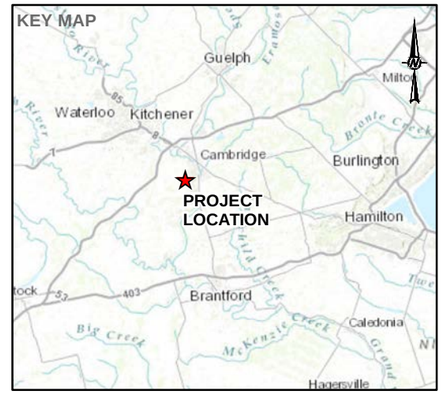
FIGURES



LEGEND

- STUDY AREA BOUNDARY
- EXPANSION LICENCE BOUNDARY
- RAILWAY
- ROAD
- WATERCOURSE
- WATERBODY
- PROVINCIALLY SIGNIFICANT WETLAND
- EXISTING ACTIVE AGGREGATE SITE
- MUNICIPAL BOUNDARY

KEY MAP



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REFERENCE(S)

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2. SITE PLAN PROVIDED BY CBM APRIL 2016
3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM:UTM ZONE 17N

CLIENT

CBM AGGREGATES

ST MARYS

PROJECT

DANCE PIT EXPANSION LICENCE
CAMBRIDGE, ONTARIO

TITLE

SITE LOCATION PLAN

CONSULTANT

GOLDER

YYYY-MM-DD	2020-01-15
DESIGNED	SO
PREPARED	SO
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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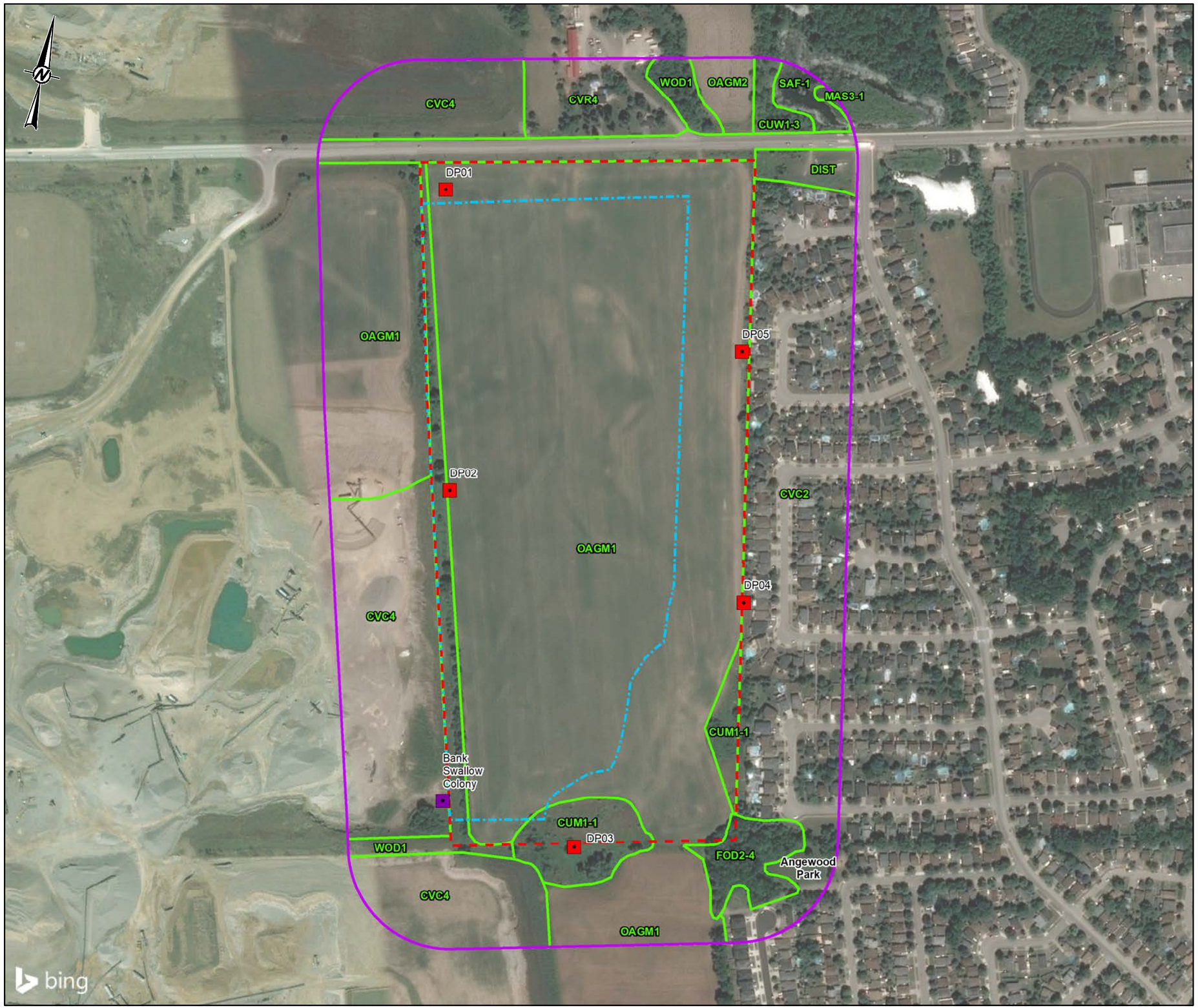

LEGEND

- EXPANSION LICENCE BOUNDARY
- PROPOSED LIMIT OF EXTRACTION FOR DANCE PIT EXPANSION
- STUDY AREA BOUNDARY
- BANK SWALLOW COLONY
- BREEDING BIRD SURVEY STATION
- PLANT COMMUNITY CLASSIFICATION

PLANT COMMUNITY CLASSIFICATION LEGEND:

AGRICULTURE
OAGM1 - ANNUAL ROW CROP
OAGM2 - PERENNIAL COVER CROP

ANTHROPOGENIC
CVR2 - HIGH DENSITY RESIDENTIAL
CVR4 - RURAL RESIDENTIAL
CVC4 - EXTRACTION INDUSTRY

TERRESTRIAL
CUM1-1 - DRY MOIST OLDFIELD MEADOW
CUW1-3 - BLACK WALNUT CULTURAL WOODLAND
WOD-1 - MINERAL DECIDUOUS WOODLAND
FOD2-4 - DRY-FRESH OAK-HARDWOOD DECIDUOUS FOREST

WETLAND
MAS3-1 - CATTAIL ORGANIC SHALLOW MARSH

AQUATIC
SAF1 - FLOATING LEAVED SHALLOW AQUATIC

0 100 200 300
1:4,500 METRES

REFERENCE(S)
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3. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83 COORDINATE SYSTEM:UTM ZONE 17N

CLIENT
CBM AGGREGATES

PROJECT
DANCE PIT EXPANSION LICENCE
CAMBRIDGE, ONTARIO

TITLE
PLANT COMMUNITY CLASSIFICATION

CONSULTANT
GOLDER

YYYY-MM-DD	2020-01-15
DESIGNED	SO
PREPARED	SO
REVIEWED	AS
APPROVED	HM

PROJECT NO.	CONTROL	REV.	FIGURE
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APPENDIX A

Species at Risk Screening

Common Name	Scientific Name	Endangered Species Act[1]	Species At Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Jefferson salamander	*Ambystoma jeffersonianum*	END	END	END	S2	In Ontario, Jefferson salamander is found only in southern Ontario, along southern portions of the Niagara Escarpment and western portions of the Oak Ridges Moraine. Jefferson salamander prefers moist, well-drained deciduous and mixed forests with a closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the early spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (i.e., sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July) (Jefferson Salamander Recovery Team 2010).	Low There are no breeding ponds or suitable forested habitat on the Site.	Low The small deciduous forest in the southeast corner of the Study Area is likely too small and dry to provide suitable habitat. Although the marsh and mixed forest north of the Site may provide suitable habitat, there are no recent occurrence records in the area.
Jefferson X Blue-spotted salamander, Jefferson genome dominates	*Ambystoma hybrid pop. 1*	—	—	—	S2	In Ontario, Jefferson x blue-spotted salamander prefers moist, well-drained deciduous and mixed forests with a closed canopy. It overwinters underground in mammal burrows and rock fissures, and moves to vernal pools and ephemeral wetlands in the early spring to breed. Breeding ponds are typically located in or near to forested habitats, and contain submerged debris (i.e. sticks, vegetation) for egg attachment sites. Ephemeral breeding pools need to have water until at least mid-summer (mid to late July) (Jefferson Salamander Recovery Team 2010).	Low There are no breeding ponds or suitable forested habitat on the Site.	Low The small deciduous forest in the southeast corner of the Study Area is likely too small and dry to provide suitable habitat. Although the marsh and mixed forest north of the Site may provide suitable habitat, there are no recent occurrence records in the area.
Gypsy cuckoo bumble bee	*Bombus bohemicus*	END	END	END	S1S2	In Ontario, gypsy cuckoo bumble bee nests in the nests of a host bumble bee species. Nests occur in meadows, old fields, mixed farmland, urban areas and open woodlands. This bee is a generalist forager and is associated with food plants flowering close to wooded areas and blueberry fields. It overwinters in the ground, in mulch or rotting logs near nesting sites (COSEWIC 2014).	Low The Site is almost entirely composed of an agricultural field. There is no abundance of flowering plants or shrubs on the Site to support this species. In addition, is it only historically known in the region.	Low There is no abundance of flowering plants or shrubs in the Study Area to support this species. In addition, is it only historically known in the region.
Monarch	*Danaus plexippus*	SC	SC	END	S2N, S4B	In Ontario, monarch is found throughout the northern and southern regions of the province. This butterfly is found wherever there are milkweed (*Asclepius* spp.) plants for its caterpillars and wildflowers that supply a nectar source for adults. It is often found on abandoned farmland, meadows, open wetlands, prairies and roadsides, but also in city gardens and parks. Important staging areas during migration occur along the north shores of the Great Lakes (COSEWIC 2010).	Moderate The edges of the agricultural field on the Site may provide suitable foraging habitat for this species.	Moderate Roadside edges, open meadows and woodland edges in the Study Area provide suitable foraging habitat for this species.
Rusty-patched bumble bee	*Bombus affinis*	END	END	END	S1	In Ontario, rusty-patched bumble bee is found in areas from the southern Great Lakes – St. Lawrence forest region southwards into the Carolinian forest. It is a habitat generalist, but it is typically found in open habitats, such as mixed farmland, savannah, marshes, sand dunes, urban and lightly wooded areas. It is cold – tolerant and can be found at high elevations. Most recent sightings in Ontario have been in oak savannah habitat with well-drained, sandy soils and moderately open canopy. It requires an abundance of flowering plants for forage. This species most often builds nests underground in old rodent burrows, but also in hollow tree stumps and fallen dead wood (Colla and Taylor-Pindar 2011). The only recent sightings in Ontario are from the Pinery Provincial Park.	Low The Site is almost entirely composed of an agricultural field. There is no abundance of flowering plants or shrubs on the Site to support this species. In addition, this species is only currently known to occur in Pinery Provincial Park.	Low There is no abundance of flowering plants or shrubs in the Study Area to support this species. In addition, this species is only currently known to occur in Pinery Provincial Park.

Common Name	Scientific Name	Endangered Species Act[1]	Species At Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Tawny emperor	*Asterocampa clyton*	—	—	—	S3	In Ontario, the tawny emperor is found in woodland habitats, including riparian and open woodlands, as well as in cities, fencerows and parks. It is found close to the larval food plant - hackberry (Layberry et al. 1998).	Low Although woodland and hedgerow habitat occur on the Site, no hackberry trees were identified during field surveys.	Low Although woodland and hedgerow habitat occur in the Study Area, no hackberry trees were identified during field surveys.
West Virginia white	*Pieris virginiensis*	SC	—	—	S3	In Ontario, West Virginia white is found primarily in the central and southern regions of the province. This butterfly lives in moist, mature, deciduous and mixed woodlands, and the caterpillars feed only on the leaves of toothwort (*Cardamine* spp.), which are small, spring-blooming plants of the forest floor. These woodland habitats are typically maple-beech-birch dominated. This species is associated with woodlands growing on calcareous bedrock or thin soils over bedrock (Burke 2013).	Low There is no suitable deciduous forest habitat on the Site.	Low The deciduous forest in the southeast corner of the Study Area does not provide preferred structure or composition to support this species. In addition, no toothwort was identified during the field surveys.
Yellow-banded bumble bee	*Bombus terricola*	SC	SC	SC	S2	This species is a forage and habitat generalist. Mixed woodlands are commonly used for nesting and overwintering, but it also occupies various open habitats including native grasslands, farmlands and urban areas. It is an early emerging species, making it likely an important pollinator of early blooming wild flowering plants (e.g. wild blueberry) and agricultural crops (e.g., apple). Nest sites are mostly abandoned rodent burrows (COSEWIC 2015).	Low The Site is almost entirely composed of an agricultural field. There is no abundance of flowering plants or shrubs on the Site to support this species.	Low There is no abundance of flowering plants or shrubs in the Study Area to support this species.
Acadian flycatcher	*Empidonax virescens*	END	END	END	S2S3B	In Ontario, the Acadian flycatcher breeds in the understory of large, mature, closed-canopy forests, swamps and forested ravines. This bird prefers forests greater than 40 ha in size, and exhibits edge sensitivity preferring the deep interior of the forest. Its nest is loosely woven and placed near the tip of branch in a small tree or shrub often, but not always, near water (Whitehead and Taylor 2002).	Low There are no large forests on the Site or in the study area to support this species. In addition, no individuals were recorded during field surveys.	Low There are no large forests in the Study Area to support this species. In addition, no individuals were recorded during field surveys.
Bank swallow	*Riparia riparia*	THR	THR	THR	S4B	In Ontario, the bank swallow breeds in a variety of natural and anthropogenic habitats, including lake bluffs, stream and river banks, sand and gravel pits, and roadcuts. Nests are generally built in a vertical or near-vertical bank. Breeding sites are typically located near open foraging sites such as rivers, lakes, grasslands, agricultural fields, wetlands and riparian woods. Forested areas are generally avoided (Garrison 1999).	High Individuals were observed on the Site during field surveys. There is no nesting habitat on the Site.	High Stockpiles located on the adjacent active Dance Pit provide suitable nesting habitat. Individuals were observed on the Site during field surveys.
Barn swallow	*Hirundo rustica*	THR	THR	THR	S4B	In Ontario, barn swallow breeds in areas that contain a suitable nesting structure, open areas for foraging, and a body of water. This species nests in human made structures including barns, buildings, sheds, bridges, and culverts. Preferred foraging habitat includes grassy fields, pastures, agricultural cropland, lake and river shorelines, cleared right-of-ways, and wetlands (COSEWIC 2011). Mud nests are fastened to vertical walls or built on a ledge underneath an overhang. Suitable nests from previous years are reused (Brown and Brown 1999).	Low There are no suitable structures on the Site to provide nesting habitat. In addition, no individuals were observed during field surveys.	Low There are no suitable structures in the Study Area to provide nesting habitat. In addition, no individuals were observed during field surveys.

Common Name	Scientific Name	Endangered Species Act[1]	Species At Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Black tern	*Chlidonias niger*	SC	—	NAR	S3B	In Ontario, black tern breeds in freshwater marshlands where it forms small colonies. It prefers marshes or marsh complexes greater than 20 ha in area and which are not surrounded by wooded area. Black terns are sensitive to the presence of agricultural activities. The black tern nests in wetlands with an even combination of open water and emergent vegetation, and still waters of 0.5-1.2 m deep. Preferred nest sites have short dense vegetation or tall sparse vegetation often consisting of cattails, bulrushes and occasionally burreed or other marshland plants. Black terns also require posts or snags for perching (Weseloh 2007).	Low There is no suitable marsh habitat on the Site. In addition, no individuals were observed during field surveys.	Low There is no suitable marsh habitat in the Study Area. In addition, no individuals were observed during field surveys.
Bobolink	*Dolichonyx oryzivorus*	THR	THR	THR	S4B	In Ontario, bobolink breeds in grasslands or graminoid dominated hayfields with tall vegetation (Gabhauer 2007). Bobolink prefers grassland habitat with a forb component and a moderate litter layer. They have low tolerance for presence of woody vegetation and are sensitive to frequent mowing within the breeding season. They are most abundant in established, but regularly maintained, hayfields, but also breed in lightly grazed pastures, old or fallow fields, cultural meadows and newly planted hayfields. Their nest is woven from grasses and forbs. It is built on the ground, in dense vegetation, usually under the cover of one or more forbs (Martin and Gavin 1995).	Low Although bobolink was observed flying over the Site during field surveys, there is no suitable habitat on the Site to support nesting for this species.	Low Although bobolink was observed flying over the Site during field surveys, there is no suitable habitat in the Study Area to support nesting for this species.
Canada warbler	*Cardellina canadensis*	SC	THR	THR	S4B	In Ontario, breeding habitat for Canada warbler consists of moist mixed forests with a well-developed shrubby understory. This includes low-lying areas such as cedar and alder swamps, and riparian thickets (McLaren 2007). It is also found in densely vegetated regenerating forest openings. Suitable habitat often contains a developed moss layer and an uneven forest floor. Nests are well concealed on or near the ground in dense shrub or fern cover, often in stumps, fallen logs, overhanging stream banks or mossy hummocks (Reitsma et al. 2010).	Low There is no suitable forested habitat on the Site to support this species. In addition, no individuals were observed during field surveys.	Low There is no suitable forested habitat in the Study Area to support this species. In addition, no individuals were observed during field surveys.
Cerulean warbler	*Setophaga cerulea*	THR	END	END	S3B	In Ontario, breeding habitat of cerulean warbler consists of second-growth or mature deciduous forest with a tall canopy of uneven vertical structure and a sparse understory. This habitat occurs in both wet bottomland forests and upland areas, and often contains large hickory and oak trees. This species may be attracted to gaps or openings in the upper canopy. The cerulean warbler is associated with large forest tracks, but may occur in woodlots as small as 10 ha (COSEWIC 2010). Nests are usually built on a horizontal limb in the mid-story or canopy of a large deciduous tree (Buehler et al. 2013).	Low There is no suitable forested habitat on the Site to support this species. In addition, no individuals were observed during field surveys.	Low There is no suitable forested habitat in the Study Area to support this species. In addition, no individuals were observed during field surveys.
Chimney swift	*Chaetura pelagica*	THR	THR	THR	S3B	In Ontario, chimney swift breeding habitat is varied and includes urban, suburban, rural and wooded sites. They are most commonly associated with towns and cities with large concentrations of chimneys. Preferred nesting sites are dark, sheltered spots with a vertical surface to which the bird can grip. Unused chimneys are the primary nesting and roosting structure, but other anthropogenic structures and large diameter cavity trees are also used (COSEWIC 2007).	Low There are no suitable structures or large diameter cavity trees on the Site to provide nesting habitat. In addition, no individuals were observed during field surveys.	Low There are unlikely to be suitable chimney structures in the Study Area. In addition, no individuals were observed during field surveys.

Common Name	Scientific Name	Endangered Species Act[1]	Species At Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Common nighthawk	*Chordeiles minor*	SC	THR	SC	S4B	These aerial foragers require areas with large open habitat. This includes farmland, open woodlands, clearcuts, burns, rock outcrops, alvars, bog ferns, prairies, gravel pits and gravel rooftops in cities (Sandilands 2007)	Low The Site is an active agricultural field that would be not be suitable to support nesting.	Low The Study Area is developed or too densely vegetated to provide suitable habitat.
Eastern meadowlark	*Sturnella magna*	THR	THR	THR	S4B	In Ontario, eastern meadowlark breeds in pastures, hayfields, meadows and old fields. Eastern meadowlark prefers moderately tall grasslands with abundant litter cover, high grass proportion, and a forb component (Hull 2003). They prefer well drained sites or slopes, and sites with different cover layers (Roseberry and Klimstra 1970)	Low There is no suitable open grassland habitat on the Site. In addition, no individuals were observed during field surveys.	Low There is no suitable open grassland habitat in the Study Area. In addition, no individuals were observed during field surveys.
Eastern whip-poor-will	*Antrostomus vociferus*	THR	THR	THR	S4B	In Ontario, the whip-poor-will breeds in semi-open forests with little ground cover. Breeding habitat is dependent on forest structure rather than species composition, and is found on rock and sand barrens, open conifer plantations and post-disturbance regenerating forest. Territory size ranges from 3 to 11 ha (COSEWIC 2009). No nest is constructed and eggs are laid directly on the leaf litter (Mills 2007).	Low There is no suitable forest habitat on the Site. In addition, there are no recent occurrence records in the area.	Low There is no suitable forest habitat in the Study Area. In addition, there are no recent occurrence records in the area.
Eastern wood-pewee	*Contopus virens*	SC	SC	SC	S4B	In Ontario, eastern wood-pewee inhabits a wide variety of wooded upland and lowland habitats, including deciduous, coniferous, or mixed forests. It occurs most frequently in forests with some degree of openness. Intermediate-aged forests with a relatively sparse midstory are preferred. In younger forests with a relatively dense midstory, it tends to inhabit the edges. Also occurs in anthropogenic habitats providing an open forested aspect such as parks and suburban neighborhoods. Nest is constructed atop a horizontal branch, 1-2 m above the ground, in a wide variety of deciduous and coniferous trees (COSEWIC 2012).	Low Although an individual was observed during field surveys, it was determined to be a migrant. There is no suitable forest habitat on the Site.	Low Although an individual was observed during field surveys, it was determined to be a migrant. There is no suitable forest habitat in the Study Area.
Grasshopper sparrow *pratensis* subspecies	*Ammodramus savannarum* (*pratensis* subspecies)	SC	SC	SC	S4B	In Ontario, grasshopper sparrow is found in medium to large grasslands with low herbaceous cover and few shrubs. It also uses a wide variety of agricultural fields, including cereal crops and pastures. Close-grazed pastures and limestone plains (e.g., Carden and Napanee Plains) support highest density of this bird in the province (COSEWIC 2013).	Low There is no suitable open grassland habitat on the Site. In addition, no individuals were observed during field surveys.	Low There is no suitable open grassland habitat in the Study Area. In addition, no individuals were observed during field surveys.
Henslow's sparrow	*Ammodramus henslowii*	END	END	END	SHB	In Ontario, Henslow's sparrow breeds in large grasslands with low disturbance, such as lightly grazed and ungrazed pastures, fallow hayfields, grassy swales in open farmland, and wet meadows. Preferred habitat contains tall, dense grass cover, typically over 30 cm high, with a high percentage of ground cover, and a thick mat of dead plant material. Henslow's sparrow generally avoids areas with emergent woody shrubs or trees, and fence lines. Areas of standing water or ephemerally wet patches appear to be important. This species breeds more frequently in patches of habitat greater than 30 ha and preferably greater than 100 ha (COSEWIC 2011).	Low There is no suitable open grassland habitat on the Site. In addition, no individuals were observed during field surveys.	Low There is no suitable open grassland habitat in the Study Area. In addition, no individuals were observed during field surveys.

Common Name	Scientific Name	Endangered Species Act[1]	Species At Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Least bittern	*Ixobrychus exilis*	THR	THR	THR	S4B	In Ontario, the least bittern breeds in marshes, usually greater than 5 ha, with emergent vegetation, relatively stable water levels and areas of open water. Preferred habitat has water less than 1 m deep (usually 10 – 50 cm). Nests are built in tall stands of dense emergent or woody vegetation (Woodliffe 2007). Clarity of water is important as siltation, turbidity, or excessive eutrophication hinders foraging efficiency (COSEWIC 2009).	Low There is no marsh habitat on the Site.	Low The marsh habitat north of the Site is too small and does not have preferred species composition or structure to provide suitable habitat.
Louisiana waterthrush	*Parkesia motacilla* (formerly *Seiurus motacilla*)	THR	THR	THR	S3B	The Louisiana waterthrush inhabits mature forests along steeply sloped ravines adjacent to running water. It prefers clear, cold streams and densely wooded swamps. Trees, bushes, exposed roots, cliffs, banks and mossy logs are favoured nesting spots. Riparian woodlands are preferred stopover sites during migration. Nests are concealed from view at the base of uprooted trees, among mosses, or under logs and in cavities along the stream bank (COSEWIC 2015).	Low There is no suitable forested habitat on the Site to support this species. In addition, no individuals were observed during field surveys.	Low There is no suitable forested habitat in the Study Area to support this species. In addition, no individuals were observed during field surveys.
Prothonotary warbler	*Protonotaria citrea*	END	END	END	S1B	In Ontario, the prothonotary warbler breeds in mature and semi-mature, deciduous swamp forest with a closed canopy, and large expanses of relatively deep, open standing water. Swamps are typically dominated by silver maple, black ash, yellow birch, and black gum. These birds nest in tree cavities, favouring small, shallow holes often situated at low heights in dead or dying trees. Nests are typically situated over standing or slow-moving water. Artificial nest boxes are also readily accepted. This species is area sensitive and is seldom found in forests less than 100 ha in size (COSEWIC 2007).	Low There is no swamp habitat on the Site to support this species. In addition, no individuals were observed during field surveys.	Low There is no swamp habitat in the Study Area to support this species. In addition, no individuals were observed during field surveys.
Red-headed woodpecker	*Melanerpes erythrocephalus*	SC	END	END	S4B	In Ontario, the red-headed woodpecker breeds in open, deciduous woodlands or woodland edges and are often found in parks, cemeteries, golf courses, orchards and savannahs (Woodliffe 2007). They may also breed in forest clearings or open agricultural areas provided that large trees are available for nesting. They prefer forests with little or no understory vegetation. They are often associated with beech or oak forests, beaver ponds and swamp forests where snags are numerous. Nests are excavated in the trunks of large dead trees (Smith et al. 2000).	Low There are no suitable large diameter snag trees to provide nesting habitat on the Site. In addition, no individuals were observed during field surveys.	Low There are no suitable large diameter snag trees to provide nesting habitat in the Study Area. In addition, no individuals were observed during field surveys.
Short-eared owl	*Asio flammeus*	SC	SC	SC	S2N,S4B	In Ontario, the short-eared owl breeds in a variety of open habitats including grasslands, tundra, bogs, marshes, clearcuts, burns, pastures and occasionally agricultural fields. The primary factor in determining breeding habitat is proximity to small mammal prey resources (COSEWIC 2008). Nests are built on the ground at a dry site and usually adjacent to a clump of tall vegetation used for cover and concealment (Gahbauer 2007).	Low There is no suitable open grassland habitat on the Site. In addition, no individuals were observed during field surveys.	Low There is no suitable open grassland habitat in the Study Area. In addition, no individuals were observed during field surveys.
Wood thrush	*Hylocichla mustelina*	SC	THR	THR	S4B	In Ontario, wood thrush breeds in moist, deciduous hardwood or mixed stands that are often previously disturbed, with a dense deciduous undergrowth and with tall trees for singing perches. This species selects nesting sites with the following characteristics: lower elevations with trees less than16 m in height, a closed canopy cover (>70%), a high variety of deciduous tree species, moderate subcanopy and shrub density, shade, fairly open forest floor, moist soil, and decaying leaf litter (COSEWIC 2012).	Low There is no suitable forest habitat on the Site to support this species. In addition, no individuals were observed during field surveys.	Low There is no suitable forest habitat in the Study Area to support this species. In addition, no individuals were observed during field surveys.

Common Name	Scientific Name	Endangered Species Act[1]	Species At Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Yellow-breasted chat	*Icteria virens*	END	END	END	S1B	In Ontario, yellow-breasted chat breeds in early successional, shrub-thicket habitats including woodland edges, regenerating old fields, railway and hydro right-of-ways, young coniferous reforestations, and wet thickets bordering wetlands. Tangles of grape (*Vitis* spp.) and raspberry (*Rubus* spp.) vines are features of most breeding sites. There is some evidence that the yellow-breasted chat is an area sensitive species. Nests are located in dense shrubbery near to the ground (COSEWIC 2011).	Low There is no early successional or shrub habitat on the Site to provide nesting habitat. In addition, no individuals were observed during field surveys.	Low There is no suitable early successional or shrub habitat in the Study Area to provide nesting habitat. In addition, no individuals were observed during field surveys.
Lake sturgeon - Great Lakes / upper St. Lawrence Population	*Acipenser fulvescens*	END	—	THR	S2	In Ontario, the lake sturgeon, a large prehistoric freshwater fish, is found in all the Great Lakes and in all drainages of the Great Lakes and of Hudson Bay. This species typically inhabits highly productive shoal areas of large lakes and rivers. They are bottom dwellers, and prefer depths between 5-10 m and mud or gravel substrates. Small sturgeons are often found on gravelly shoals near the mouths of rivers. They spawn in depths of 0.5 to 4.5 m in areas of swift water or rapids. Where suitable spawning rivers are not available, such as in the lower Great Lakes, they are known to spawn in wave action over rocky ledges or around rocky islands (Golder 2011).	Low There is no aquatic habitat on the Site.	Low The marsh off Site to the north does not provide suitable aquatic habitat conditions to support this species.
Redside dace	*Clinostomus elongatus*	END	END	END	S2	In Ontario, the redside dace, a small coolwater species common in the USA but less so in Canada, is found in tributaries of western Lake Ontario, Lake Erie, Lake Huron and Lake Simcoe. They are found in pools and slow-moving areas of small headwater streams with clear to turbid water. Overhanging grasses, shrubs, and undercut banks, are an important part of their habitat, as are instream boulders and large woody debris. Preferred substrates are variable and include silt, sand, gravel and boulders. Spawning occurs in shallow riffle areas (Redside Dace Recovery Team 2010).	Low There is no aquatic habitat on the Site.	Low The marsh off Site to the north does not provide suitable aquatic habitat conditions to support this species.
Silver shiner	*Notropis photogenis*	THR	THR	THR	S2S3	In Ontario, the silver shiner is found in the Thames and Grand Rivers, and it has been recently reported in Bronte Creek and Sixteen Mile Creek which flow into Lake Ontario. They prefer moderately-flowing sections of larger streams with clear water and moderate currents. Usual substrates include gravel, rubble, boulder, and sand. Aquatic vegetation may be present or absent. The silver shiner most frequently occurs in deep, swift riffles and faster currents of pools below riffles. Spawning habitat is suggested to occur in relatively deep riffles (COSEWIC 2011).	Low There is no aquatic habitat on the Site.	Low The marsh off Site to the north does not provide suitable aquatic habitat conditions to support this species.
American badger *jacksoni* subspecies (southwestern population)	*Taxidea taxus jacksoni*	END	END	END	S2	In Ontario, American badger's preferred habitats include undisturbed grasslands, shrubby areas and open woodlands, but the species will also use old fields, pastures, edges of agricultural fields and roadsides. The key factor for habitat suitability for this species is presence of prey, comprised mainly of woodchuck and eastern cottontail, and Franklin's ground squirrel in northwestern Ontario (Ontario American Badger Recovery Team 2010).	Low The majority of the Site is composed of active agricultural field and does not provide suitable habitat.	Low The Study Area consists primarily of active quarry and agriculture, and residential developments. There is no suitable open woodland or undisturbed grassland habitat in the Study Area.

Common Name	Scientific Name	Endangered Species Act[1]	Species At Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Eastern cougar	*Puma concolor couguar*	END	—	DD	SU	This species historically inhabited extensive forested areas in Ontario. It is found in habitats suitable for white-tailed deer and mule deer, which are the preferred prey of the cougar. Dense cover is considered the key habitat feature for cougar. An average home range for males is 300 square kilometers, and for females, 150 square kilometers (Environment Canada and Canadian Wildlife Federation 2013).	Low There is no extensive forested habitat on the Site to support this species. In addition, the overall region is too developed and fragmented from a larger overall area of natural areas and forest to support cougar.	Low There is no extensive forested habitat in the Study Area to support this species. In addition, the overall region is too developed and fragmented from a larger overall area of natural areas and forest to support cougar.
Gray fox	*Urocyon cinereoargenteus*	THR	THR	THR	S1	While the Ontario range of this species extends across much of southern and southeastern Ontario, the only known population in the province is on Pelee Island, with very rare sightings elsewhere in the province at points close to the border with the United States. This species inhabits deciduous forests and marshes, and will den in a variety of features including rock outcroppings, hollow trees, burrows or brush piles, usually where dense brush provides cover and in close proximity to water. This species is considered a habitat generalist (COSEWIC 2002).	Low The only currently known population occurs on Pelee Island.	Low The only currently known population occurs on Pelee Island.
Eastern small-footed myotis	*Myotis leibii*	END	—	—	S2S3	This species is not known to roost within trees, but there is very little known about its roosting habits. The species generally roosts on the ground under rocks, in rock crevices, talus slopes and rock piles. It occasionally inhabits buildings. Areas near the entrances of caves or abandoned mines may be used for hibernaculum, where the conditions are drafty with low humidity, and may be subfreezing (Humphrey 2017)	Low There are no suitable rock piles or exposed bedrock on the Site to provide suitable roosting habitat.	Low There are no suitable rock piles or exposed bedrock in the Study Area to provide suitable roosting habitat.
Little brown myotis	*Myotis lucifugus*	END	END	END	S3	In Ontario, this specie's range is extensive and covers much of the province. It will roost in both natural and man-made structures. Roosting colonies require a number of large dead trees, in specific stages of decay and that project above the canopy in relatively open areas. May form nursery colonies in the attics of buildings within 1 km of water. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	Low The deciduous forest in the southeast corner of the Site and the Manitoba maple / willow inclusion in the meadow at the south end of the Site are unlikely to provide suitable roosting habitat. No cavities were observed in trees on the Site.	Moderate Woodlands located off Site to the north may provide suitable roosting habitat.
Northern myotis	*Myotis septentrionalis*	END	END	END	S3	In Ontario, this species' range is extensive and covers much of the province. It will usually roost in hollows, crevices, and under loose bark of mature trees. Roosts may be established in the main trunk or a large branch of either living or dead trees. Caves or abandoned mines may be used as hibernacula, but high humidity and stable above freezing temperatures are required (ECCC 2018).	Low The deciduous forest in the southeast corner of the Site and the Manitoba maple / willow inclusion in the meadow at the south end of the Site are unlikely to provide suitable roosting habitat. No cavities were observed in trees on the Site.	Moderate Woodlands located off Site to the north may provide suitable roosting habitat.

Common Name	Scientific Name	Endangered Species Act[1]	Species At Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Tri-colored bat	*Perimyotis subflavus*	END	END	END	S3?	In Ontario, tri-colored bat may roost in foliage, in clumps of old leaves, hanging moss or squirrel nests. They are occasionally found in buildings although there are no records of this in Canada. They typically feed over aquatic areas with an affinity to large-bodied water and will likely roost in close proximity to these. Hibernation sites are found deep within caves or mines in areas of relatively warm temperatures. These bats have strong roost fidelity to their winter hibernation sites and may choose the exact same spot in a cave or mine from year to year (ECCC 2018).	Low The deciduous forest in the southeast corner of the Site and the Manitoba maple / willow inclusion in the meadow at the south end of the Site are unlikely to provide suitable roosting habitat.	Moderate Woodlands located off Site to the north may provide suitable roosting habitat.
Mapleleaf mussel	*Quadrula quadrula*	SC	SC	SC	S2	In Ontario, the mapleleaf is usually found in medium to large rivers with slow to moderate currents and firmly packed substrate of sand, coarse gravel or clay/mud. It may also occur in shallow lakes, big river embayments and deep river impoundments (COSEWIC 2016).	Low There is no aquatic habitat on the Site.	Low The marsh off Site to the north does not provide suitable aquatic habitat conditions to support this species. In addition, there are no occurrence records in the area.
Rainbow mussel	*Villosa iris*	SC	SC	SC	S2S3	In Ontario, the rainbow mussel is found in shallow, well-oxygenated waters of small to medium-sized rivers and sometimes lakes. It is most abundant in waters less than 1 m deep. Preferred substrates are cobble, gravel, sand and occasionally mud (COSEWIC 2015).	Low There is no aquatic habitat on the Site.	Low The marsh off Site to the north does not provide suitable aquatic habitat conditions to support this species. In addition, there are no occurrence records in the area.
Wavy-rayed lampmussel	*Lampsilis fasciola*	THR	END	SC	S1	In Ontario, wavy-rayed lampmussel inhabits clear, medium-sized rivers and streams, with steady flow and stable substrate. It is typically found in clean sand or gravel substrates, often stabilized with cobble or boulders, in and around riffle areas up to 1 m in depth. It may also be found in large creeks and rivers (Morris 2011).	Low There is no aquatic habitat on the Site.	Low The marsh off Site to the north does not provide suitable aquatic habitat conditions to support this species. In addition, there are no occurrence records in the area.
Pygmy pocket moss	*Fissidens exilis*	—	NAR	SC	S2	In Ontario, pygmy pocket moss grows in the southwestern region of the province. Pygmy pocket moss typically grows on bare, moist, clay soil. It occurs primarily in woodlands, but also on disturbed soils, such as in floodplains (COSEWIC 2016).	Low There is no suitable exposed clay soils in woodlands on the Site.	Low There is no suitable exposed clay soils in woodlands or floodplains in the Study Area.
Blanding's turtle - Great Lakes / St. Lawrence population	*Emydoidea blandingii*	THR	THR	END	S3	In Ontario, Blanding's turtle will use a range of aquatic habitats, but favor those with shallow, standing or slow-moving water, rich nutrient levels, organic substrates and abundant aquatic vegetation. They will use rivers, but prefer slow-moving currents and are likely only transients in this type of habitat. This species is known to travel great distances over land in the spring in order to reach nesting sites, which can include dry conifer or mixed forests, partially vegetated fields, and roadsides. Suitable nesting substrates include organic soils, sands, gravel and cobble. They hibernate underwater and infrequently under debris close to water bodies (COSEWIC 2016).	Low There is no aquatic habitat on the Site to support this species. There is limited, low-quality nesting habitat on the Site.	Moderate The marsh north of the Site may provide suitable aquatic habitat. Suitable nesting substrates may also occur adjacent to the marsh. However, there are no recent occurrence records in the area.

Common Name	Scientific Name	Endangered Species Act[1]	Species At Risk Act (Sch 1)[2]	COSEWIC[3]	Provincial (SRank)[4]	Habitat Requirements[5]	Potential to Occur on Site	Potential to Occur in the Study Area
Eastern hog-nosed snake	*Heterodon platirhinos*	THR	THR	THR	S3	Eastern hog-nosed snake can be classified as a habitat generalist as it uses a variety of habitats across its range. In Ontario, this snake typically uses habitat with open vegetation cover, including open woodlands, wetlands, fields, forest edges, beaches and dunes, and disturbed sites, most often near water. Hibernation occurs in sandy soils below the frost line. This species has been observed excavating hibernation sites in mixed intolerant upland forests. Nesting and oviposition has been noted in upland sandy areas and rock outcrops under large flat rocks. The majority of their diet is comprised of American toad and Fowler's toad (Kraus 2011).	Low There is no open naturalized areas of woodland, marsh or field on the Site to provide suitable habitat for hog-nosed snake. In addition, there are no recent occurrence records in the area.	Low Although the marsh north of the Site may provide suitable habitat, there are no recent occurrence records in the area.
Eastern ribbonsnake - Great Lakes population	*Thamnophis sauritius*	SC	SC	SC	S4	In Ontario, eastern ribbonsnake is semi-aquatic, and is rarely found far from shallow ponds, marshes, bogs, streams or swamps bordered by dense vegetation. They prefer sunny locations and bask in low shrub branches. Hibernation occurs in mammal burrows, rock fissures or even ant mounds (COSEWIC 2012).	Low There is no aquatic or wetland habitat on the Site.	Moderate – High The marsh north of the Site may provide suitable habitat for ribbonsnake. In addition, there are recent occurrence records in the area.
Milksnake	*Lampropeltis triangulum*	NAR	SC	SC	S4	In Ontario, milksnake uses a wide range of habitats including prairies, pastures, hayfields, wetlands and various forest types, and is well-known in rural areas where it frequents older buildings. Proximity to water and cover enhances habitat suitability. Hibernation takes place in mammal burrows, hollow logs, gravel or soil banks, and old foundations (COSEWIC 2014).	Moderate Milksnake may use the agricultural field on the Site, as well as the hedgerows as habitat.	Moderate Milksnake may use the marsh and woodlands north of the Site as habitat.
Queensnake	*Regina septemvittata*	END	END	END	S2	In Ontario, queensnake requires permanent aquatic habitat with large flat rocks, either submerged or on the bank/shoreline. Individuals rarely leave the shoreline of permanent bodies of water with abundant shoreline cover and a healthy population of crayfish. They are fairly intolerant of silty substrates and most commonly are found in streams with bedrock and gravel substrates. The best sites have water temperatures that remain at or above 18◦C during the active season, have a swift to moderate current and woodland surroundings. Hibernacula may occur in the abutments of old bridges, in clay slopes above the high-water mark and in bedrock fissures (Gillingwater 2011).	Low There is no aquatic habitat on the Site.	Low The marsh north of the Site does not provide suitable aquatic habitat. Although there is a recent occurrence record in the area (NHIC), the record is for the population that occurs along the Grand River approximately 1.8 km east of the Study Area. In addition, there is no hydrological connection between the marsh in the Study Area and the Grand River to allow dispersal.
Northern map turtle	*Graptemys geographica*	SC	SC	SC	S3	In Ontario, the northern map turtle prefers large waterbodies with slow-moving currents, soft substrates, and abundant aquatic vegetation. Ideal stretches of shoreline contain suitable basking sites, such as rocks and logs. Along Lakes Erie and Ontario, this species occurs in marsh habitat and undeveloped shorelines. It is also found in small to large rivers with slow to moderate flow. Hibernation takes place in soft substrates under deep water (COSEWIC 2012).	Low There is no aquatic habitat on the Site to support this species.	Low The marsh north of the Site is likely too small and disconnected from a larger overall system of ponds and lakes to provide suitable aquatic habitat.
Snapping turtle	*Chelydra serpentina*	SC	SC	SC	S4	In Ontario, snapping turtle utilizes a wide range of waterbodies, but shows preference for areas with shallow, slow-moving water, soft substrates and dense aquatic vegetation. Hibernation takes place in soft substrates under water. Nesting sites consist of sand or gravel banks along waterways or roadways (COSEWIC 2008).	Low There is no aquatic habitat on the Site to support this species. There is limited, low-quality nesting habitat on the Site.	Moderate - High The marsh north of the Site may provide suitable aquatic habitat, and there are recent occurrence records in the area.

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American chestnut	*Castanea dentata*	END	END	END	S1S2	In Ontario, American ginseng is found in moist, undisturbed and relatively mature deciduous woods often dominated by sugar maple. It is commonly found on well-drained, south-facing slopes. American ginseng grows under closed canopies in well-drained soils of glaciary origin that have a neutral pH (ECCC 2018).	Low There is no suitable deciduous forest on the Site and no individuals were identified during field surveys.	Low There is no suitable deciduous forest in the Study Area.
American ginseng	*Panax quinquefolius*	END	END	END	S2	In Ontario, American ginseng is found in moist, undisturbed and relatively mature deciduous woods often dominated by sugar maple. It is commonly found on well-drained, south-facing slopes. American ginseng grows under closed canopies in neutral, loamy soils (ECCC 2018).	Low There is no suitable deciduous forest on the Site. In addition, no individuals were identified during field surveys.	Low The forest north of the Site is likely too small and disturbed to provide suitable habitat.
Broad beech fern	*Phegopteris hexagonoptera*	SC	—	SC	S3	In Ontario, broad beech fern inhabits rich, undisturbed mature deciduous forest dominated by beech and maple. It typically grows in moist to wet, sandy soils of lower valley slopes and occasionally swamps (van Overbeeke et al. 2013).	Low There is no suitable deciduous forest on the Site. In addition, no individuals were identified during field surveys.	Low The forest north of the Site is likely too small and disturbed to provide suitable habitat.
Burning bush	*Euonymus atropurpureus*	—	—	—	S3	Burning bush grows in moist deciduous woods, thickets, floodplain forests and along riverbanks (Reznicek et al. 2011). It is often found in association with maple, basswood and beech-dominated deciduous forests (Hilty 2016).	Low The deciduous forest in the southeast corner of the Site does not provide suitable habitat conditions. In addition, no individuals were identified during field surveys. The last occurrence record for the area was 1902 (NHIC).	Low The deciduous forest in the southeast corner of the Study Area does not provide suitable habitat conditions. The last occurrence record for the area was 1902 (NHIC).
Butternut	*Juglans cinerea*	END	END	END	S2?	In Ontario, butternut is found along stream banks, on wooded valley slopes, and in deciduous and mixed forests. It is commonly associated with beech, maple, oak and hickory (Voss and Reznicek 2012). Butternut prefers moist, fertile, well-drained soils, but can also be found in rocky limestone soils. This species is shade intolerant (Farrar 1995).	Low The majority of the Site is composed of active agricultural field. No individuals were identified during field surveys.	Moderate There is potential for individuals to occur in the forest north of the Site.
Chinese hemlock parsley	*Conioselinum chinense*	—	—	—	S2	In Ontario, Chinese hemlock parsley occurs in moist habitats, including calcareous cedar swamps, along stream and river edges, on seepage slopes in wet coniferous woods, swampy thickets, moist clearings and damp roadsides (Reznicek et al. 2011). In northern Ontario, it is found in willow-alder thickets.	Low There is no aquatic or wetland habitat on the Site. In addition, the last occurrence record for the area was 1904 (NHIC).	Low There is no swamp or suitable wetland habitat in the Study Area. In addition, the last occurrence record for the area was 1904 (NHIC).
Downy yellow false foxglove	*Aureolaria virginica*	—	—	END	S1	In Ontario, downy yellow false foxglove grows in dry open woods and savannahs (Oldham and Brinker 2009).	Low No individuals were recorded on the Site during the field investigation. In addition, the last occurrence record for the area was 1902 (NHIC).	Low - Moderate This species may occur in the deciduous woodland north of the Site. However, the last occurrence record for the area was 1902 (NHIC).
False hop sedge	*Carex lupuliformis*	END	END	END	S1	In Ontario, false hop sedge occurs in marshes, riverine swamps, borders of vernal pools, and wet depressions of forests. It occasionally occurs in shallow water or very wet floodplain forests. Usually grows under a moderately open canopy but can tolerate high levels of sunshine. Substrates are calcareous or neutral and include moist wet mucks, silt loams, or alluvial deposits with a sandy texture (Environment Canada 2014).	Low There is no aquatic or wetland habitat on the Site. In addition, the last occurrence record for the area was 1902 (NHIC).	Low Suitable habitat may occur in the marsh off-Site to the north. However, the last occurrence record for the area was 1902 (NHIC).

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Green dragon	*Arisaema dracontium*	SC	—	SC	S3	In Ontario, green dragon occurs in somewhat-wet to wet deciduous forests along streams. In particular, it grows in maple forest and forest dominated by red ash and white elm trees. Green dragon is restricted to shaded or partially shaded seasonally inundated floodplains (Donley et al. 2013). It is primarily restricted to southwestern Ontario.	Low There is no deciduous forest adjacent to aquatic or wetland habitat on the Site. In addition, the last occurrence record for the area was 1904 (NHIC).	Low There are no suitable wet forests in the Study Area. In addition, the last occurrence record for the area was 1904 (NHIC).
Hairy valerian	*Valeriana edulis*	—	—	END	S1	Hairy valerian grows in wet meadows or prairies, and calcareous fens. It may also occur in moist areas along stream banks, wooded valleys or open meadows (USDA 2003).	Low There is no fen or wet meadow / prairie habitat on the Site. In addition, the last occurrence record for the area was 1901 (NHIC).	Low There is no fen or wet meadow / prairie habitat in the Study Area. In addition, the last occurrence record for the area was 1901 (NHIC).
Hairy-fruited sedge	*Carex trichocarpa*	—	—	—	S3	In Ontario, hairy-fruited sedge grows in extensive colonies on floodplains and riverbanks in southern Ontario (Oldham and Brinker 2009).	Low There is no aquatic or wetland habitat on the Site.	Moderate Suitable habitat may occur along the marsh shoreline north of the Site.
Harbinger-of-spring	*Erigenia bulbosa*	—	—	—	S2S3	In Ontario, harbinger-of-spring is an early ephemeral species that grows in rich, moist deciduous woodlands. It is often associated with flood plains, bottomlands and riverbanks (Oldham and Brinker 2009).	Low There is no suitable rich, wet deciduous forest on the Site. In addition, the last occurrence record for the area was 1910 (NHIC).	Low There is no suitable rich, wet deciduous forest in the Study Area. In addition, the last occurrence record for the area was 1910 (NHIC).
Long-styled Canadian sanicle	*Sanicula canadensis var. grandis*	—	—	—	S2	In Ontario, long-styled Canadian sanicle grows in rich deciduous woodlands (Oldham and Brinker 2009).	Low There is no suitable rich, wet deciduous forest on the Site. In addition, the last occurrence record for the area was 1904 (NHIC).	Low There is no suitable rich, wet deciduous forest in the Study Area. In addition, the last occurrence record for the area was 1904 (NHIC).
Moss phlox	*Phlox subulata*	—	—	—	S1?	Moss phlox grows in sandy or rocky soils along roadsides, railways, and rocky bluffs or ledges, as well as rocky prairies (Hilty 2018).	Low No individuals were recorded on the Site during the field investigation. In addition, the last occurrence record for the area was 1895 (NHIC).	Low Individuals may occur along roadsides in the Study Area. However, the last occurrence record for the area was 1895 (NHIC).
Northern hawthorn	*Crataegus dissona*	—	—	—	S3	In Ontario, northern hawthorn grows in old fields and neglected pastures and along fencelines and roadsides (NEWFS 2019). It is mainly found in the Niagara Peninsula (Oldham and Brinker 2009).	Low The majority of the Site is active agriculture and does not provide suitable habitat. No individuals were recorded during field surveys.	Low There is no suitable habitat off-Site in the Study Area. No individuals were recorded during field surveys adjacent to the Site.
Northern pin oak	*Quercus ellipsoidalis*	—	—	—	S3	In Ontario, northern pin oak grows in dry sandy or rocky woods as well as along roadsides, fence lines and forest edges (Reznicek et al. 2011).	Low No individuals were recorded on the Site during field surveys.	Moderate This species may occur in the deciduous woodland north of the Site.
Pawpaw	*Asimina triloba*	—	—	—	S3	In Ontario, pawpaw grows in rich moist deciduous woods and swamps, and is often found on floodplains and along stream banks (Reznicek et al. 2011).	Low There is no suitable rich, wet deciduous forest on the Site. No individuals were recorded on the Site during the field investigation.	Low There is no suitable rich, wet deciduous forest in the Study Area.

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Pignut hickory	*Carya glabra*	—	—	—	S3	In Ontario, pignut hickory frequently grows on dry ridgetops and side slopes in association with other hickories and oaks, but it is also common growing in moist, fertile bottomland woodlands (Hilty 2018).	Low There is no suitable rich, wet deciduous forest on the Site. No individuals were recorded on the Site during the field investigation.	Low There is no suitable rich, wet deciduous forest in the Study Area.
Puttyroot	*Aplectrum hyemale*	—	—	—	S2	In Ontario, puttyroot grows in rich, moist deciduous woods dominated by beech-maple, as well as swamps (Reznicek et al. 2011).	Low There is no suitable rich, wet deciduous forest on the Site. In addition, the last occurrence record for the area was 1909 (NHIC).	Low There is no suitable rich, wet deciduous forest in the Study Area. In addition, the last occurrence record for the area was 1909 (NHIC).
Ram's-head lady's-slipper	*Cypripedium arietinum*	—	—	—	S3	Ram's-head lady's-slipper can be found in moist coniferous swamps, dry sandy woods and limestone barrens.	Low There is no suitable woodland habitat on the Site. In addition, the last occurrence record for the area was 1900 (NHIC).	Low This species may occur in the deciduous woodland north of the Site. However, the last occurrence record for the area was 1900 (NHIC).
Scarlet beebalm	*Monarda didyma*	—	—	—	S3	In Ontario, scarlet beebalm grows in moist open woods and swampy thickets. It can often be found along streambanks, thickets, woodland edges and roadsides (Reznicek et al. 2011).	Low There is no suitable woodland habitat on the Site. In addition, the last occurrence record for the area was 1892 (NHIC).	Low This species may occur in the deciduous woodland north of the Site. However, the last occurrence record for the area was 1892 (NHIC).
Sharp-fruited rush	*Juncus acuminatus*	—	—	—	S3	In Ontario, sharp-fruited rush grows in old fields, prairies and ditches or along sand or gravel shorelines in moist, often sandy and sunny ground. It can also be found in gravel pits (Reznicek et al. 2011).	Low The majority of the Site is active agriculture and does not provide suitable habitat. No individuals were recorded during field surveys on the Site. In addition, the last occurrence record for the area was 1902 (NHIC).	Low There is no suitable habitat in the Study Area. In addition, the last occurrence record for the area was 1902 (NHIC).
Slim-flowered muhly	*Muhlenbergia tenuiflora*	—	—	—	S2	In Ontario, slim-flowered muhly grows on forested dunes, hillsides, and riverbanks in oak or beech-maple forests (Reznicek et al. 2011).	Low There is no suitable rich, wet deciduous forest on the Site. No individuals were recorded on the Site during the field investigation.	Low There is no suitable rich, wet deciduous forest in the Study Area.
Smith's bulrush	*Schoenoplectus smithii*	—	—	—	S2S3	In Ontario, Smith's bulrush grows in moist, sandy or muddy shorelines or beaches with large water fluctuations (FNA 2008).	Low There is no aquatic or wetland habitat on the Site. In addition, the last occurrence record for the area was 1902 (NHIC).	Low Although the marsh north of the Site may provide suitable shoreline habitat, the last occurrence record for the area was 1902 (NHIC).
Soft-hairy false gromwell	*Onosmodium molle ssp. hispidissimum*	—	—	—	S2	Soft-hairy false gromwell grows in dry, open, rocky or gravelly hillsides, in thickets, fields or prairies in calcareous regions (NatureServe 2018).	Low No individuals were recorded on the Site during the field survey. In addition, the last occurrence record for the area was 1940 (NHIC).	Low There is no suitable open grassland or prairie habitat in the Study Area to support this species. In addition, the last occurrence record for the area was 1940 (NHIC).

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Stiff gentian	*Gentianella quinquefolia*	—	—	—	S2	In Ontario, stiff gentian grows along stream and river banks, in marshy meadows, and on bluffs and forested hillsides. This species usually grows in calcareous sites (Reznicek et al. 2011).	Low No individuals were recorded on the site during the field investigation. In addition, the last occurrence record for the area was 1902 (NHIC).	Low Potential habitat may occur in the deciduous woodland north of the Site. However, the last occurrence record for the area was 1902 (NHIC).
Wild licorice	*Glycyrrhiza lepidota*	—	—	—	S3	Wild licorice grows in field and prairies, as well as along roadsides, creek banks, railways and in disturbed areas (Hilty 2017).	Low No individuals were recorded on the Site during the field survey. In addition, the last occurrence record for the area was 1902 (NHIC).	Low Potential habitat may occur along roadsides or disturbed areas in the Study Area. However, the last occurrence record for the area was 1902 (NHIC).
Woodland flax	*Linum virginianum*	—	—	—	S2	Woodland flax grows in open oak forest, upland woods, and dry to mesic lakeside and riparian forests (MNFI 2007).	Low There is no suitable forest habitat on the Site.	Moderate The deciduous woodland north of the Site may provide suitable habitat.

[1] *Endangered Species Act* (ESA), 2007 (O.Reg 242/08 last amended 27 March 2018 as O.Reg 219/18). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

[2] *Species at Risk Act* (SARA), 2002. Schedule 1 (Last amended 21 May 2019); Part 1 (Extirpated), Part 2 (Endangered), Part 3 (Threatened), Part 4 (Special Concern)

[3] Committee on the Status of Endangered Wildlife in Canada (COSEWIC) http://www.cosewic.gc.ca/

[4] Provincial Ranks (SRANK) are Rarity Ranks assigned to a species or ecological communities, by the Natural Heritage Information Centre (NHIC). These ranks are not legal designations. SRANKS are evaluated by NHIC on a continual basis and updated lists produced annually. SX (Presumed Extirpated), SH (Possibly Extirpated - Historical), S1 (Critically Imperiled), S2 (Imperiled), S3 (Vulnerable), S4 (Apparently Secure), S5 (Secure), SNA (Not Applicable), S#S# (Range Rank), S? (Not ranked yet), SAB (Breeding Accident), SAN (Non-breeding Accident), SX (Apparently Extirpated). Last assessed November 2017.

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APPENDIX B

Tree Inventory

Table B1: Trees inventoried on the western Site boundary and on adjacent residential properties

Tree No.	Species		Approximate Size		Condition		Comments[c]
	Common Name	Botanical Name	Height (m)	DBH (cm)	Canopy[a]	Health[b]	
A1	Norway Spruce	*Picea abies*	12	30	Good	Good	Mature
A2	Norway Spruce	*Picea abies*	12	30	Good	Good	Mature
A3	White Poplar	*Populus alba*	10	10	Good	Good	Mature
A4	Red Pine	*Pinus resinosa*	8	15	Poor	Poor	Mature
A5	White Poplar	*Populus alba*	15	10	Poor	Poor	Mature
A6	White Poplar	*Populus alba*	15	15	Poor	Poor	Mature
A7	White Poplar	*Populus alba*	15	15	Poor	Poor	Mature
A8	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A9	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A10	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A11	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A12	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A13	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A14	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A15	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature

Tree No.	Species		Approximate Size		Condition		Comments[c]
	Common Name	Botanical Name	Height (m)	DBH (cm)	Canopy[a]	Health[b]	
A16	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A18	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A19	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A20	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A21	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A22	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A23	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A24	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A25	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A26	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A27	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A28	White Poplar	*Populus alba*	15	25	Poor	Poor	Mature
A29	Black Locust	*Robinia pseudoacacia*	5	10	Good	Good	Mature
A30	Black Locust	*Robinia pseudoacacia*	5	10	Good	Good	Mature
A31	American Smoke Tree	*Cotinus obovauts*	3	5,5,10	Good	Good	Mature, Multi-stemmed
A32	Black Locust	*Robinia pseudoacacia*	10	15,20	Good	Good	Mature, Multi-stemmed

Tree No.	Species		Approximate Size		Condition		Comments[c]
	Common Name	Botanical Name	Height (m)	DBH (cm)	Canopy[a]	Health[b]	
B1*	Black Locust	*Robinia pseudoacacia*	15	42	Good	Good	Mature
B2*	Black Locust	*Robinia pseudoacacia*	15	29	Good	Good	Mature
B3*	Black Locust	*Robinia pseudoacacia*	15	23,15	Good	Good	Mature, Multi-stemmed
B4	Norway Spruce	*Picea abies*	15	15	Good	Good	Mature
B5	White Spruce	*Picea glauca*	6	10	Good	Good	Mature
B6	Manitoba Maple	*Acer negundo*	4	10	Good	Good	Mature
B7	Norway Spruce	*Picea abies*	15	35	Good	Good	Mature
B8	Black Locust	*Robinia pseudoacacia*	6	10	Good	Good	Mature
B9	Blue Spruce	*Picea pungens*	10	20	Good	Good	Mature
1C*	Little Leaf Linden	*Tilia cordata*	10	18	Good	Good	Mature
2C*	Manitoba Maple	*Acer negundo*	8	10,15,15	Good	Good	Mature, Multi-stemmed
2.1C	Red Cedar	*Juniperus virginiana*	4	10	Good	Good	Mature
3C*	Manitoba Maple	*Acer negundo*	10	20,15,10, 10	Good	Good	Mature, Multi-stemmed
3.1C	European Ash	*Fraxinus excelsior*	15	25	Good	Good	Mature
3.2C	Norway Maple	*Acer plantanoides*	10	15	Good	Good	Mature
3.3C	Honey Locust	*Gleditsia triacanthos*	6	15	Good	Good	Mature

Tree No.	Species		Approximate Size		Condition		Comments[c]
	Common Name	Botanical Name	Height (m)	DBH (cm)	Canopy[a]	Health[b]	
4C*	Norway Maple	*Acer plantanoides*	3	5	Good	Good	Mature
4.1C	Norway Spruce	*Picea abies*	3	10	Good	Good	Mature
5 C*	Manitoba Maple	*Salix alba*	6	15	Good	Good	Mature
6 C*	White Willow	*Salix alba*	20	54	Good	Good	Very Mature
7 C*	White Willow	*Salix alba*	20	63	Good	Good	Very Mature
7.1C*	White Willow	*Salix alba*	15	15	Good	Good	Mature
7.2C*	White Willow	*Salix alba*	15	15	Good	Good	Mature
8 C*	White Willow	*Salix alba*	20	35	Good	Good	Mature
9 C*	White Willow	*Salix alba*	15	22	Good	Good	Mature
10C*	White Willow	*Salix alba*	15	19, 20	Good	Good	Mature, Multi-stemmed
11C*	White Willow	*Salix alba*	15	24, 25,18	Good	Good	Mature, Multi-stemmed
11.1C	Honey Locust	*Gleditsia triacanthos*	10	25	Good	Good	Mature
11.2C	Honey Locust	*Gleditsia triacanthos*	8	20	Good	Good	Mature
11.3C	Apple	*Malus pumila*	4	10	Good	Good	Mature
12C*	White Cedar (cultivar)	*Thuja occidentalis*	4	7	Good	Good	Mature
12.1C	Sugar Maple	*Acer saccharum*	8	18	Good	Good	Mature

Tree No.	Species		Approximate Size		Condition		Comments[c]
	Common Name	Botanical Name	Height (m)	DBH (cm)	Canopy[a]	Health[b]	
12.2C	Weeping Falsecypress	*Chamaecyparis nootkatensis*	8	10	Good	Good	Mature
12.3C	Blue Spruce	*Picea pungens*	8	10	Good	Good	Mature
12.4C	Callery Pear	*Pyrus calleryana*	4	25	Good	Good	Mature
12.5C	Blue Spruce	*Picea pungens*	8	6	Good	Good	Mature
12.6C	Cherry sp.	*Prunus sp.*	10	25	Good	Good	Mature
12.7C	Blue Spruce	*Picea pungens*	10	20	Good	Good	Mature
12.8C	White Spruce	*Picea glauca*	10	20	Good	Good	Mature
12.9C	Blue Spruce	*Picea pungens*	10	20	Good	Good	Mature
13C	Blue Spruce	*Picea pungens*	10	10,18,15	Good	Good	Mature, Multi-stemmed
13.1C	Blue Spruce	*Picea pungens*	5	15	Good	Good	Mature
13.2C	Blue Spruce	*Picea pungens*	5	18	Good	Good	Mature
13.3C	Blue Spruce	*Picea pungens*	5	10	Good	Good	Mature
13.4C	Blue Spruce	*Picea pungens*	10	35	Good	Good	Mature
13.5C	Blue Spruce	*Picea pungens*	10	30	Good	Good	Mature
13.6C	Blue Spruce	*Picea pungens*	10	30	Good	Good	Mature
13.7C	Blue Spruce	*Picea pungens*	10	20	Good	Good	Mature

Tree No.	Species		Approximate Size		Condition		Comments[c]
	Common Name	Botanical Name	Height (m)	DBH (cm)	Canopy[a]	Health[b]	
13.8C	Blue Spruce	*Picea pungens*	10	20	Good	Good	Mature
13.9C	Silver Maple	*Acer saccharinum*	10	15,15,15,10	Good	Good	Mature, Multi-stemmed
14C	White Mulberry	*Morus alba*	8	5,10,10	Good	Good	Mature, Multi-stemmed
14.1C	Manitoba Maple	*Acer negundo*	6	10, 5	Good	Good	Mature, Multi-stemmed
14.2C	Manitoba Maple	*Acer negundo*	6	10, 5	Good	Good	Mature, Multi-stemmed
14.3C*	Manitoba Maple	*Acer negundo*	6	10,15	Good	Good	Mature, Multi-stemmed
14.4C	Silver Maple	*Acer saccharinum*	15	5,10, 20	Good	Good	Mature, Multi-stemmed
15C*	Manitoba Maple	*Acer negundo*	15	33, 33	Good	Good	Mature, Multi-stemmed
15.1C	Manitoba Maple	*Acer negundo*	10	15	Good	Good	Mature
15.2C	Manitoba Maple	*Acer negundo*	6	5	Good	Good	Mature
15.3C	Manitoba Maple	*Acer negundo*	6	5	Good	Good	Mature
16C*	Manitoba Maple	*Acer negundo*	6	5	Good	Good	Mature
16.1C*	Manitoba Maple	*Acer negundo*	10	15	Good	Good	Mature
16.2C*	Manitoba Maple	*Acer negundo*	10	15	Good	Good	Mature
16.3C*	Manitoba Maple	*Acer negundo*	6	10	Good	Good	Mature
16.4C*	Willow Sp.	*Salix sp.*	5	5	Good	Good	Mature

Tree No.	Species		Approximate Size		Condition		Comments[c]
	Common Name	Botanical Name	Height (m)	DBH (cm)	Canopy[a]	Health[b]	
16.5C*	European Buckthorn	*Rhamnus cathartica*	5	5	Good	Good	Mature
16.6C*	Willow Sp.	*Salix sp.*	5	5	Good	Good	Mature
17C*	Manitoba Maple	*Acer negundo*	8	21	Good	Good	Mature
17.1C	Sweet Cherry (cultivar)	*Prunus avium*	3	15	Good	Good	Mature
17.2C	Freeman's Maple	*Acer x Freemanii*	15	35	Good	Good	Mature
17.3C	Blue Spruce	*Picea pungens*	15	30, 30, 30, 25, 25	Good	Good	Mature, Multi-stemmed
17.4C	Blue Spruce	*Picea pungens*	15	15	Good	Good	Mature
17.5C	Blue Spruce	*Picea pungens*	15	15	Good	Good	Mature
17.6C	Blue Spruce	*Picea pungens*	15	15	Good	Good	Mature
17.7C	Blue Spruce	*Picea pungens*	15	15	Good	Good	Mature
17.8C	Blue Spruce	*Picea pungens*	15	15	Good	Good	Mature
17.9C*	White Poplar	*Populus alba*	20	15	Good	Good	Mature

[a] Good: Tree canopy with at least 75% live growth; Fair: Tree canopy with 30% or greater canopy dieback; Poor: Tree canopy with 50% or greater canopy dieback.
[b] Good: Trees with no to minimal observable and no major visible trunk damage; Fair: Multi-stemmed (coppice) growth, significant stem lean or some trunk damage; Poor: Dead or dying trees (later stages of disease, majority of canopy dead, etc.).
[c] Mature: Reaches average reproductive maturity size (based on dbh, height and other external factors such as bark thickness) that the growing conditions will allow for that species; Very mature: Above average reproductive maturity size (i.e., larger size given the growth conditions than an average mature tree of that species); Multi-stem: more than one trunk (stem) originating below the breast height as a result of tree injury or characteristic of that species.

Table B2: Trees inventoried in Angewood Park

Tree No.	Species		Approximate Size		Condition		Comments[c]
	Common Name	Botanical Name	Height (m)	DBH (cm)	Canopy[a]	Health[b]	
18C	Manitoba Maple	*Acer negundo*	20	15	Good	Good	Mature
18.1C	Manitoba Maple	*Acer negundo*	20	15	Good	Good	Mature
18.2C	Manitoba Maple	*Acer negundo*	20	15	Good	Good	Mature
18.3C	Manitoba Maple	*Acer negundo*	35	15	Good	Good	Mature
18.4C	Manitoba Maple	*Acer negundo*	35	15	Good	Good	Mature
18.5C	Manitoba Maple	*Acer negundo*	35	15	Good	Good	Mature
18.6C	Manitoba Maple	*Acer negundo*	15	15	Good	Good	Mature
18.7C	Manitoba Maple	*Acer negundo*	15	15	Good	Good	Mature
18.8C	Manitoba Maple	*Acer negundo*	15	15	Good	Good	Mature
18.9C	Manitoba Maple	*Acer negundo*	25	15	Good	Good	Mature
19C	Manitoba Maple	*Acer negundo*	25	15	Good	Good	Mature
19.1C	Manitoba Maple	*Acer negundo*	35	15	Good	Good	Mature
19.2C	Manitoba Maple	*Acer negundo*	35	15	Good	Good	Mature
19.3C	Manitoba Maple	*Acer negundo*	20	15	Good	Good	Mature
19.4C	Manitoba Maple	*Acer negundo*	20	15	Good	Good	Mature
19.5C	Manitoba Maple	*Acer negundo*	20	15	Good	Good	Mature

Tree No.	Species		Approximate Size		Condition		Comments[c]
	Common Name	Botanical Name	Height (m)	DBH (cm)	Canopy[a]	Health[b]	
19.6C	Manitoba Maple	*Acer negundo*	15	15	Good	Good	Mature
19.7C	Manitoba Maple	*Acer negundo*	15	15	Good	Good	Mature
19.8C	Manitoba Maple	*Acer negundo*	15	15	Good	Good	Mature
19.9C	Manitoba Maple	*Acer negundo*	25	15	Good	Good	Mature
20C	Manitoba Maple	*Acer negundo*	25	15	Good	Good	Mature
20.1C	Manitoba Maple	*Acer negundo*	35	15	Good	Good	Mature
20.2C	Manitoba Maple	*Acer negundo*	35	15	Good	Good	Mature
20.3C	Manitoba Maple	*Acer negundo*	35	15	Good	Good	Mature
20.4C	Manitoba Maple	*Acer negundo*	30	15	Good	Good	Mature
20.5C	Manitoba Maple	*Acer negundo*	30	15	Good	Good	Mature
20.6C	Manitoba Maple	*Acer negundo*	30	15	Good	Good	Mature
20.7C	Manitoba Maple	*Acer negundo*	35	15	Good	Good	Mature
20.8C	Red Oak	*Quercus rubra*	20	65	Good	Good	Very Mature
20.9C	Black Cherry	*Prunus serotina*	20	46	Good	Good	Very Mature

[a] Good: Tree canopy with at least 75% live growth; Fair: Tree canopy with 30% or greater canopy dieback; Poor: Tree canopy with 50% or greater canopy dieback.
[b] Good: Trees with no to minimal observable and no major visible trunk damage; Fair: Multi-stemmed (coppice) growth, significant stem lean or some trunk damage; Poor: Dead or dying trees (later stages of disease, majority of canopy dead, etc.).
[c] Mature: Reaches average reproductive maturity size (based on dbh, height and other external factors such as bark thickness) that the growing conditions will allow for that species; Very mature: Above average reproductive maturity size (i.e., larger size given the growth conditions than an average mature tree of that species); Multi-stem: more than one trunk (stem) originating below the breast height as a result of tree injury or characteristic of that species.

APPENDIX C

Vascular Plant List

Appendix C
Vascular Plant List

Scientific Name	Common Name	Origin[a]	SRank[b]	GRANK[b]	ESA[c]
Acer x freemanii	Freemna's maple	—	SNA	GNR	—
Acer platanoides	Norway maple	I	SNA	GNR	—
Acer negundo	Manitoba maple	I	S5	G5	—
Acer saccharum	Sugar maple	N	S5	G5	—
Acer saccharinum	Silver maple	N	S5	G5	—
Alliaria petiolata	Garlic mustard	I	SNA	GNR	—
Ambrosia artemisiifolia	Ragweed	N	S5	G5	—
Antennaria neglecta	Field pussytoes	N	S5	G5	—
Arctium lappa	Giant burdock	I	SNA	GNR	—
Arctium minus	Common burdock	I	SNA	GNR	—
Bromus inermis	Smooth brome	I	SNA	GNR	—
Chamaecyparis nootkatensis	Weeping falsecypress	—	—	—	—
Cirsium arvense	Canada thistle	I	SNA	GNR	—
Cirsium vulgare	Bull thistle	I	SNA	GNR	—
Clinopodium vulgare	Wild basil	N	S5	G5	—
Cotinus obovauts	American smoke tree	N	—	—	—
Crataegus sp.	Hawthorn sp.	—	—	—	—
Daucus carota	Wild carrot	I	SNA	GNR	—
Dipsacus fullonum	Fuller's teasel	I	SNA	GNR	—
Fraxinus excelsior	European ash	I	SNA	GNR	—
Gleditsia triacanthos	Honey-locust	N	S2?	G5	—
Hesperis matronalis	Dame's rocket	I	SNA	G4G5	—
Hypericum perforatum	Common St. John’s-wort	I	SNA	GNR	—
Impatiens capensis	Spotted jewelweed	N	S5	G5	—
Juniperus virginiana	Eastern red cedar	N	S5	G5	—
Leonurus cardiaca	Common motherwort	I	SNA	GNR	—
Leucanthemum vulgare	Ox-eye daisy	I	SNA	GNR	—
Lonicera tatarica	Tartarian honeysuckle	I	SNA	GNR	—
Lythrum salicaria	Purple loosestrife	I	SNA	G5	—
Malus pumila	Apple	I	SNA	G5	—
Medicago sativa	Alfalfa	I	S5	GNR	—
Monarda fistulosa	Wild bergamot	N	S5	G5	—
Morus alba	White mulberry	I	SNA	GNR	—
Phalaris arundinacea	Reed canary grass	N	S5	G5	—
Phleum pratense	Timothy	I	SNA	GNR	—
Picea abies	Norway spruce	I	SNA	G5	—
Picea pungens	Blue spruce	I	SNA	G5	—
Picea glauca	White spruce	N	S5	G5	—
Pinus resinosa	Red pine	N	S5	G5	—
Populus alba	White poplar	I	SNA	G5	—
Prunus sp.	Cherry sp.	—	—	—	—
Prunus avium	Sweet cherry	I	SNA	GNR	—
Pyrus calleryana	Callery pear	—	—	—	—
Rhamnus cathartica	Common / European buckthorn	I	SNA	GNR	—
Rhus typhina	Staghorn sumac	N	S5	G5	—
Robinia pseudoacacia	Black locust	I	SNA	G5	—
Rubus idaeus	Red raspberry	N	S5	G5T5	—
Rumex crispus	Curled dock	I	SNA	GNR	—
Salix spp.	Willow spp. (white or crack)	I	SNA	GNR	—
Salix alba	White willow	I	SNA	G5	—
Sambucus nigra	Black elderberry	I	SNA	G5T5	—
Saponaria officinalis	Bouncing-bet	I	SNA	GNR	—
Sicyos angulatus	Bur-cucumber	N	S5	G5	—
Silene vulgaris	Bladder campion	I	SNA	GNR	—
Solanum dulcamara	Bittersweet nightshade	I	SNA	GNR	—
Solidago sp.	Goldenrod sp.	—	—	—	—
Thuja occidentalis	Eastern white cedar	N	S5	G5	—
Tilia cordata	Little leaf linden	I	SNA	GNR	—
Tragopogon dubius	Goat's-beard	I	SNA	GNR	—
Trifolium pratense	Red clover	I	SNA	GNR	—
Urtica dioica	Stinging nettle	N	S5	G5T?	—
Verbascum thapsus	Common mullein	I	SNA	GNR	—
Vicia cracca	Cow-vetch	I	SNA	GNR	—
Vitis riparia	Riverbank grape	N	S5	G5	—

[a] Origin: N = Native; (N) = Native but not in study area region; I = Introduced.

[b] Ranks based upon determinations made by the Ontario Natural Heritage Information Centre.

G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure.

SNA = Not applicable for Ontario Ranking (e.g. Exotic species); SNR = Provincial conservation status not yet assessed;
B = status applies to the breeding population of the species

[d] Ontario *Endangered Species Act* (ESA), 2007 (O.Reg 242/08 last amended 27 March 2018 as O.Reg 219/18). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

APPENDIX D

Wildlife List

Common Name	Scientific Name	SRANK[a]	GRANK[a]	ESA[b]
American Crow	*Corvus brachyrhynchos*	S5B	G5	—
American Goldfinch	*Carduelis tristis*	S5B	G5	—
American Robin	*Turdus migratorius*	S5B	G5	—
Bank Swallow	***Riparia riparia***	**S4B**	**G5**	**Threatened**
Belted Kingfisher	*Megaceryle alcyon*	S4B	G5	—
Blue Jay	*Cyanocitta cristata*	S5	G5	—
Bobolink	***Dolichonyx oryzivorus***	**S4B**	**G5**	**Threatened**
Brown Thrasher	*Toxostoma rufum*	S4B	G5	—
Brown-headed Cowbird	*Molothrus ater*	S4B	G5	—
Canada Goose	*Branta canadensis*	S5	G5	—
Chipping Sparrow	*Spizella passerina*	S5B	G5	—
Common Grackle	*Quiscalus quiscula*	S5B	G5	—
Eastern Kingbird	*Tyrannus tyrannus*	S4B	G5	—
Eastern Phoebe	*Sayornis phoebe*	S5B	G5	—
Eastern Wood-Pewee	***Contopus virens***	**S4B**	**G5**	**Special Concern**
European Starling	*Sturnus vulgaris*	SNA	G5	—
Field Sparrow	*Spizella pusilla*	S4B	G5	—
Horned Lark	*Eremophila alpestris*	S5B	G5	—
House Sparrow	*Passer domesticus*	SNA	G5	—
Indigo Bunting	*Passerina cyanea*	S4B	G5	—
Killdeer	*Charadrius vociferus*	S5B, S5N	G5	—
Mallard	*Anas platyrhynchos*	S5	G5	—
Mourning Dove	*Zenaida macroura*	S5	G5	—
Northern Cardinal	*Cardinalis cardinalis*	S5	G5	—
Red-eyed Vireo	*Vireo olivaceus*	S5B	G5	—
Red-tailed Hawk	*Buteo jamaicensis*	S5	G5	—
Red-winged Blackbird	*Agelaius phoeniceus*	S4	G5	—
Rock Pigeon	*Columba livia*	SNA	G5	—
Song Sparrow	*Melospiza melodia*	S5B	G5	—

[a] Ranks based upon determinations made by the Ontario Natural Heritage Information Centre

G = Global; S = Provincial; Ranks 1-3 are considered imperiled or rare; Ranks 4 and 5 are considered secure.

SNA = Not applicable for Ontario Ranking (e.g. Exotic species)

[b] Ontario *Endangered Species Act* (ESA), 2007 (O.Reg 242/08 last amended 27 March 2018 as O.Reg 219/18). Species at Risk in Ontario List, 2007 (O.Reg 230/08 last amended 1 Aug 2018 as O. Reg 404/18, s. 1.); Schedule 1 (Extirpated - EXP), Schedule 2 (Endangered - END), Schedule 3 (Threatened - THR), Schedule 4 (Special Concern - SC)

Species designated under the ESA are bolded.

APPENDIX E

Curriculum Vitae

Golder Associates Ltd. – Mississauga

Principal, Senior Ecologist

Heather Melcher is a Principal, Senior Ecologist and Project Manager/Director with Golder Associates. Heather has over 20 years of experience working in a number of sectors including transportation, oil and gas, transmission, land development, power, aggregates and mining. Her experience lies in designing, managing and carrying out environmental impact assessments within provincial and federal frameworks and environmental land use policies for projects of various size and complexity. She leads a team of ecologists and multi-disciplinary project teams to holistically assess potential project impacts through integration of components. Heather works closely with provincial and federal agencies to help her clients navigate changing planning and species at risk (SAR) legislation. Heather has experience developing rehabilitation plans for disturbed sites and biodiversity plans that integrate the ecology of a smaller site into the regional system as well as developing compensation habitat plans and mitigation plans for SAR. Heather is also a recognized expert witness for Local Planning Appeal Tribunal (LPAT) hearings in Ontario.

Education

M.Sc. Applied Marine Science, University of Plymouth, Devon, UK, 1998

B.Sc. (Honours) Biology, Laurentian University, Sudbury, Ontario, 1996

Certifications

PADI Master Scuba Diver Trainer, 2000

Small Craft Boat Operator, 2003

Small Non-pleasure Vessel Basic Safety - MED A3, 2011

Canadian Red Cross First Aid and CPR, 2012

WHMIS Training, 1990, 2001, 2004, 2016

Languages

English – Fluent

Employment History

Golder Associates Ltd. – Mississauga, Ontario
Principal, Senior Ecologist (2004 to Present)

Project manager, project director and/or technical lead or advisor on multi-disciplinary projects of varying size and complexity. Leads a team of ecologists in Ontario and responsible for business development as a global client lead.

ESG International – Guelph, Ontario
Ecologist/Environmental Planner (2002 to 2003)

Specialized in resource management and land use planning. Worked with clients, residential and commercial land developers, land planners and regulatory agencies to obtain permits and approvals, specifically within the framework of Niagara Escarpment and Oak Ridges Moraine legislation. Compiled, assessed and reported on marine data collected for international projects.

CBCL Ltd – Halifax, Nova Scotia
Ecologist/Environmental Planner (2001 to 2002)

Intermediate project manager responsible for designing and implementing environmental effects monitoring, environmental impact assessment, and natural heritage projects. Developed and implemented marine and freshwater fisheries and benthic investigations, aquatic habitat assessments, and water quality and sediment assessments. Liaised with clients and regulatory agencies (federal and provincial), to obtain development permits and approvals.

PROJECT EXPERIENCE – CONSTRUCTION MATERIALS

CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Caledon Quarry
Caledon, Ontario, Canada

Project manager and natural environment component lead for a below water quarry licence application under the Aggregate Resources Act (ARA). Surveys completed to support the natural environment component included fish and fish habitat, breeding birds, bats, anuran (frog and toad), turtle, species at risk, vegetation community, botanical, wetland and woodland delineation. As project manager, coordinated schedules and budget, and led public, Indigenous and agency consultation. Other discipline studies to support the project included hydrogeology, resource evaluation, karst assessment, surface water, blasting design, noise, air quality, archaeology, cultural heritage, visual assessment.

Alamos Island Gold, Aggregate Pit T06-07
Dubreuilville, Ontario, Canada

Senior advisor/technical reviewer for a below water pit permit application under the ARA. Provided direction and oversight for terrestrial and aquatic studies, including the following surveys: nightjar passive acoustic, amphibian call count, fish and fish habitat, breeding bird, vegetation community and botanical. Reviewed all draft and final deliverables.

Scotian Materials Limited
Halifax, Nova Scotia, Canada

Senior technical lead (biophysical) for the provincial environmental assessment to support the expansion of an existing quarry. Studies completed to support the project included fish and fish habitat, species at risk, flora and fauna and wetland surveys. The technical lead for the impact assessment for the natural environment and the completion of supporting permit/approval applications. Scope included the completion of wetland and wildlife management plans.

EWL Ltd., Gordon Lake Quarry and Borrow Area
Kenora, Ontario, Canada

Natural environment component lead for permit applications under the Aggregate Resources Act (ARA). The aggregate areas are in support of rehabilitation activities associated with the decommissioning of the former Gordon-Werner Lake Mine. Coordinated aquatic and terrestrial field data collection and analysis, interpreted and integrated data with hydrogeological and surface water components, and developed a Natural Environment Level 1/2 (NEL 1/2) technical report. Responsible for negotiations with the Ministry of Natural Resources and Forestry (MNRF) and Ministry of Environment, Conservation and Parks (MECP) regarding woodland caribou and SAR bats. Prepared and submitted permitting applications under the Endangered Species Act (ESA), developed mitigation plans and coordinated with construction team.

Lafarge Canada Inc., McGill Pit
Kemptville, Ontario, Canada

Natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis, interpreted and integrated data with hydrogeological and surface water components and completed a comprehensive, integrated impact assessment. Developed progressive and final rehabilitation plans, participated in agency and public consultation and produced an NEL 1/2 report and municipal Environmental Impact Study (EIS) report. Led negotiations with the MNRF regarding SAR issues and developed mitigation and habitat compensation plans for butternut. Participated in an Ontario Municipal Board (OMB) hearing as an expert witness.

Colacem Cement
L'Orignal, Ontario, Canada

Natural environment component lead for the Colacem Cement Plant assessment. Designed and coordinated aquatic and terrestrial field data collection and analysis, interpreted and integrated data with physical resource components. Developed an EIS for the municipal approval process. Worked with MNRF and South Nation Conservation on significant natural heritage feature and SAR issues and with Fisheries and Oceans Canada (DFO) on a Fisheries Act authorization for removal of fish habitat. Currently preparing for participation in a LPAT (formerly the OMB) hearing as an expert witness.

CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Dance Pit Expansion
North Dumfries, Ontario, Canada

Project manager and natural environment technical advisor for an above water pit licence application under the ARA. Worked with the natural environment component lead to collect, analyse, interpret and integrate terrestrial and aquatic data with hydrogeological and surface water components. Developed a rehabilitation plan, consulted with the Grand River Conservation Authority, the MNRF and MECP, the Region of Waterloo, the Municipality of North Dumfries and the City of Cambridge, and participated in agency and public consultation. Coordinated and managed the activities of a multi-disciplinary team including hydrogeologists, surface water engineers, noise, air quality, visual assessment and vibration specialists, public consultation and Indigenous community engagement specialists, and archaeologists. Managed and tracked overall project budget and schedule.

CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Lanci Pit Expansion
Aberfoyle, Ontario, Canada

Project manager and natural environment technical advisor for an above water pit licence application under the ARA. Worked with the natural environment component lead to analyse, interpret and integrate terrestrial and aquatic data with hydrogeological and surface water components. Developed a rehabilitation plan, consulted with the Grand River Conservation Authority, the MNRF, the municipality, and participated in agency and public consultation. Coordinated and managed the activities of a multi-disciplinary team including hydrogeologists, surface water engineers, noise scientists, archaeologists, and an Indigenous Community engagement team. Managed and tracked overall project budget and schedule.

Cavanagh Construction Ltd., Henderson II Quarry
Ottawa, Ontario, Canada

Natural environment component lead for a below water quarry licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis, interpreted and integrated data with hydrogeological and surface water components and completed a comprehensive integrated impact assessment. Developed a rehabilitation plan, participated in agency and public consultation and developed an NEL 1/2 report and municipal EIS report. Led negotiations with the MNRF regarding SAR issues and developed compensation plans.

Tackaberry Sand and Gravel Ltd., Perth Quarry
Perth, Ontario, Canada

Natural environment component lead for a below water quarry licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis, interpreting and integrated data with hydrogeological and surface water components. Developed a rehabilitation plan, participated in agency and public consultation and developed an NEL 1/2 report and municipal EIS. Led negotiations with the MNRF regarding SAR issues and developed compensation plans for the removal of habitat. Worked with Rideau Valley Conservation Authority and Mississippi Valley Conservation Authority on headwater drainage feature assessment and mitigation plans.

Greenfield Aggregates Sherk Pit Waterloo, Ontario, Canada	Natural environment component lead for a below water pit licence application under the ARA. Analysed and integrated terrestrial and aquatic data with hydrogeological and surface water components, completed a comprehensive and integrated impact assessment. Developed a rehabilitation plan and an NEL 1/2 report and municipal EIS report. Participated in consultation with the Region and the Ecological and Environmental Advisory Committee (EEAC).
Lafarge Canada Inc., French Settlement Pit Ottawa, Ontario, Canada	Natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and municipal EIS report. Consulted with regulatory agencies and participated in public consultation process.
Lafarge Canada Inc., Sunningdale Pit London, Ontario, Canada	Natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Completed a comprehensive and integrated impact assessment. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and EIS. Consulted with regulatory agencies and participated in public consultation process. Developed mitigation and habitat compensation plans under the ESA for barn swallow.
Lafarge Canada Inc., Limebeer Pit Caledon, Ontario, Canada	Project manager and natural environment component lead for a below water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Completed a comprehensive and integrated impact assessment. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and EIS. Consulted with regulatory agencies, participated in public consultation process. Coordinated and managed the activities, schedule and budget of a multi-disciplinary team including hydrogeologists, groundwater modelling experts, surface water engineers, and noise and air quality specialists.
Lafarge Canada Inc., Avening Pit Extension Creemore, Ontario, Canada	Project manager and natural environment component lead for an above water pit licence application under the ARA. Coordinated aquatic and terrestrial field data collection and analysis. Interpreting and integrated data with hydrogeological and surface water components. Completed a comprehensive and integrated impact assessment. Developed a progressive and final rehabilitation plan and an NEL 1/2 report and EIS. Coordinated and managed the activities, schedule and budget of a multi-disciplinary team including hydrogeologists, surface water engineers, and noise and air quality specialists.
Floyd Preston Ltd. Eastern Ontario, Canada	Natural environment component lead for a quarry licence application under the ARA. Liaised with client, coordinated field data collection, mentored intermediate staff in data analysis and interpretation and prepared an NEL 1 report.

PROJECT EXPERIENCE – SPECIES AT RISK

EWL Management Ltd Madawaska Mine Decommissioning
Faraday, Ontario, Canada

Natural environment component lead for SAR permitting for bats, including little brown myotis (Myotis lucifugus), northern myotis (Myotis septentrionalis) and tricolor bat (Perimyotis subflavus). Prepared and submitted permitting documents under the ESA, led consultation with the MNRF and MECP, developed a mitigation plan and provided direction to the construction team.

TransCanada - Various Sites in Ontario
Ontario, Canada

Natural environment component lead for multi-year annual SAR and migratory bird monitoring at numerous sites across Ontario since 2012. In support of TransCanada's right-of-way maintenance brushing program. Provide SAR advice and liaise with MNRF to develop construction monitoring protocols for SAR and migratory birds. Lead crews to complete monitoring on an annual basis.

Lafarge Canada Ltd.
Various Locations, Ontario, Canada

Natural environment component lead for multi-year annual SAR monitoring and reporting at aggregate sites across Ontario following registration. Species surveys include Blanding's turtle, loggerhead shrike, least bittern and gray ratsnake. Developed survey protocols with several MNRF district offices and lead crews to complete monitoring.

Leader Resources Services Ltd.
Various Locations, Ontario, Canada

Project manager for a number of wind power projects under the Ontario Renewable Energy Approvals Act (REA). Worked with the client and the MNRF to develop protocols and coordinate field surveys. Completed and submitted ESA permitting applications and compensation plans.

Lafarge Canada Ltd.
Various Locations, Ontario, Canada

Project manager and natural environment component lead for a number of licence applications for proposed new and expanded aggregate extraction operations (pits and quarries) in Ontario under the ARA. Developed survey protocols, consulted with the MNRF, registered for activities under the ESA (Notice of Activity), completed Information Gathering Forms (IGF), prepared and submitted permit applications and developed compensation plans.

PROJECT EXPERIENCE – TRANSMISSION

Hydro One Circuit B5C/B6C Line Refurbishment EA
Westover to Burlington, Ontario, Canada

Natural environment component lead for a provincial Class Environmental Assessment for a 40 km line refurbishment. Designed the field program (terrestrial and aquatic), analysed and integrated data with other physical resource disciplines. Completed a comprehensive and integrated impact assessment. Led consultation with regulatory agencies including two district MNRF offices, Hamilton Conservation Authority, Conservation Halton, Grand River Conservation Authority, Niagara Escarpment Commission, and participating in the public consultation process. Provided input into alternatives assessment for temporary hydro line bypass and developed reports.

Wataynikaneyap Power Phase 2 Transmission Line
Northwestern Ontario, Canada

Senior advisor and technical reviewer for the wildlife component of permitting. Worked with the permitting lead and the wildlife component lead to design field programs, consult and negotiate with the MNRF and Environment and Climate Change Canada/Canadian Wildlife Service (ECCC/CWS), and prepare technical supporting documents for permitting and permit applications under the ESA, the Public Lands Act, and the federal Species at Risk Act (SARA). Provided senior leadership and technical guidance and review for all deliverables.

Nextbridge East-West Tie Transmission Line
Wawa to Thunder Bay, Ontario, Canada

Senior advisor and technical reviewer for wildlife permitting for the construction and operation of a 450 km transmission corridor. Worked with the permitting lead and the wildlife component lead to design field programs, consult and negotiate with the MNRF and ECCC/CWS, and prepare technical supporting documents for permitting and permit applications under the ESA, the Public Lands Act, and the SARA. Provided senior leadership and technical guidance and review for all deliverables.

PROJECT EXPERIENCE – TRANSPORTATION

MTO Calamity Creek Highway 11 Culvert Replacement Group 'C' Class EA
Temiskaming, Ontario, Canada

Acting environmental manager for the replacement of the Calamity Creek Culvert (47-273/C) located on Highway 11 in the City of Temiskaming Shores, District of Temiskaming. Regular consultation with the MTO, the contractor and Golder's internal team including ecologists, surface water engineers, archaeologists, cultural heritage specialists, and hydrogeologists. Deliverables included a Consultation Plan, an Environmental Screening Document (ESD), which documented the results of all factor-specific environmental studies and consultation undertaken for the project, and an Environmental Management Plan (EMP), which detailed how the environmental mitigation and monitoring commitments made in the ESD would be implemented during construction.

Ninth Line Municipal Class EA
Halton Region, Ontario, Canada

Senior natural environment technical lead. Led a team of ecologists, analysed and interpreted terrestrial and aquatic data and completed impact assessment. Liaised with prime engineering firm and agencies including the municipality and the MNRF. Provided senior technical review of natural environment study report and permitting documents.

Regional Road 57 Municipal Class EA
Clarington, Ontario, Canada

Senior natural environment technical lead. Led a team of ecologists, analysed and interpreted terrestrial and aquatic data and completed impact assessment. Liaised with prime engineering firm and agencies. Provided senior technical review of natural environment study report.

Markham GO Station Road Realignment Municipal Class EA
Markham, Ontario, Canada

Senior natural environment technical lead. Led a team of ecologists, analysed and interpreted terrestrial and aquatic data and completed impact assessment. Liaised with prime engineering firm and agencies. Provided senior technical review of natural environment study report.

PROJECT EXPERIENCE – SERVICING/INFRASTRUCTURE

Peel Wastewater Treatment Plan
Region of Peel, Ontario, Canada

Project manager and senior advisor and technical reviewer for the natural environment component for a Schedule C Environmental Assessment for the capacity expansion of the central Mississauga wastewater system. Managed a multi-disciplinary team including natural environment, archaeology, cultural heritage, and geotechnical engineering. Designed the natural environment field program and worked with the component lead to analyse and intepret data. Provided senior leadership and technical guidance and review for all natural environment deliverables.

Niagara Falls Wastewater Servicing Strategy
Niagara Falls, Ontario, Canada

Natural environment component lead for a Class Environmental Assessment for a Niagara Falls wastewater servicing strategy for a new south Niagara Falls wastewater treatment plant. Developed ecological matrices for determining the short-list of alternative sites, including constraints anlayses, designed field program and managed a team of ecologists. Analysed, interpreted and integrated data with physical resource components. Completed impact assessment, developed reports and participated in the public consultation process.

Clarksburg Master Servicing Plan
Clarksburg, Ontario, Canada

Senior advisor and technical reviewer for the natural environment component for a Class Environmental Assessment. Worked with the component lead to design field program and analyse and interpret data. Provided senior leadership and technical guidance and review for all deliverables.

Cambridge Zone 3
Cambridge, Ontario, Canada

Senior advisor and technical reviewer for the natural environment component for a Class Environmental Assessment for regional water system upgrades in Cambridge and North Dumfries. Worked with the component lead to design field program and analyse and interpret data. Provided senior leadership and technical guidance and review for all deliverables.

Town of Blue Mountains Water Supply Master Plan
Blue Mountains, Ontario, Canada

Senior advisor and technical reviewer for the natural environment component for a Class B Environmental Assessment. Worked with the component lead to design field program and analyse and interpret data. Provided senior leadership and technical guidance and review for all deliverables.

Region of Peel East to West Wastewater Diversion Strategy
Peel Region, Ontario, Canada

Senior advisor and technical reviewer for the natural environment component for a Class Environmental Assessment. Worked with the component lead to design field program and analyse and interpret data. Provided senior leadership and technical guidance and review for all deliverables.

PROJECT EXPERIENCE – WASTE

County of Simcoe Landfills and Transfer Stations
Various Sites in the County of Simcoe, Ontario, Canada

Senior natural environment technical lead for a number of landfill sites. Assisted the County with landuse planning, due diligence for new properties, approvals and permits for expansions and changing uses. Coordinated field investigations including wetland boundary delineation. Consulted with Conservation Authorities, Niagara Escarpment Commission and MNRF.

Humberstone Landfill
Niagara, Ontario, Canada

Senior advisor and technical reviewer for a provincial EA in support of a landfill expansion. Worked with the natural environment component lead to design field programs, consult with provincial agencies and prepare technical reports. Provided senior leadership and technical guidance and review for all deliverables.

Capital Region Resource Recovery Centre (CRRRC)
Ottawa, Ontario, Canada

Natural environment component lead for a provincial EA for a resource recovery centre on a 175 hectare site), including a landfill, contaminated soil management and recycling components. Designed the field program (terrestrial and aquatic), analysed and integrated data with other disciplines, completed an impact assessment. Consulted with regulatory agencies including the Conservation Authority, MNRF and DFO. Provided input to the project design, obtained permits and participated in the public consultation process.

PROJECT EXPERIENCE – RENEWABLE ENERGY

Trillium Power Wind Corporation
Lake Ontario, Ontario, Canada

Project manager and natural environment lead for an offshore wind power project in Lake Ontario under O. Reg. 359/09 Renewable Energy Approvals (REA). Coordinated and managed a multi-disciplinary team comprised of noise specialists, biologists, archaeologists, public consultation specialists, aboriginal engagement specialists, visual impact assessment specialists and geophysicists. Designed terrestrial and aquatic field surveys, including avian, bat and fisheries assessments. Led provincial and federal agency consultation and participated in public open houses. Impact assessment and reporting, designed to satisfy both provincial and federal (CEAA) requirements, was underway when the project was curtailed.

Leader Resources Services Corporation
Various Locations, Ontario, Canada

Project manager and project director/senior technical advisor for four wind farm projects under O. Reg. 359/09 REA in Huron County, Ontario. Coordinated and managed a multi-disciplinary team comprised of noise specialists, natural heritage specialists, archaeologists, cultural heritage specialists, public consultation specialists and aboriginal engagement specialists. Led regulatory agency consultation specifically regarding SAR, avian and bat issues, and participated in public consultation process. Directed and reviewed all baseline natural environment impact assessment, mitigation and monitoring reporting, including species at risk, waterbodies, and wildlife/habitat (with a focus on birds and bats). Completed REA-specific project reports.

Mann Engineering/EffiSolar
Various Locations, Ontario, Canada

Natural heritage component lead for four 10 MW ground-mounted PV solar farms in southeastern Ontario under O. Reg. 359/09 REA. Designed and coordinated field programs for terrestrial and aquatic ecosystems, including SAR. Completed impact assessment, mitigation and monitoring plans and reports and led provincial agency consultation.

SkyPower Corp.
Various Locations, Ontario, Canada

Project manager for eight wind power park projects in Renfrew County, Prince Edward County and Parry Island, Ontario. Designed and coordinated natural environment field programs, including terrestrial (avian, bats, SAR, wildlife/habitats) and aquatic. Managed a multi-disciplinary team including hydrogeologists, biologists, surface water engineers, noise and air quality experts, socio-economic and public consultation coordinators. Led provincial agency and public consultation. Completed natural environment impact assessment, mitigation and monitoring plans and reports and REA-specific project reports.

Algonquin Power
Amherst Island, Ontario, Canada

Project manager and natural environment component lead for wind power project in Prince Edward County. Designed and coordinated field programs for terrestrial (avian, bats, SAR) and aquatic ecosystems. Managed a multi-disciplinary team including hydrogeologists, biologists, surface water engineers, noise and air quality experts, socio-economic and public consultation coordinators. Led provincial and federal agency consultation and participated in public consultation. Completed natural environment impact assessment, mitigation and monitoring plans and reports and REA-specific project reports.

SkyPower Corp.
Various Locations, Ontario, Canada

Project manager for four solar power projects across Ontario, including Napanee and Norfolk. Designed, coordinated and conducted field programs and data collection. Coordinated and managed the activities of a multi-disciplinary team including noise, archaeology, and surface water. Completed screening reports to provincial and municipal standards.

OptiSolar Inc.
Various Locations, Ontario, Canada

Project manager for three solar power projects across Ontario, including Sarnia, Tilbury and Petrolia. Designed, coordinated and conducted field programs and data collection, coordinated and managed the activities of a multi-disciplinary team including noise, archaeology, surface water, traffic and natural environment. Completed screening reports to provincial and municipal standards.

PROJECT EXPERIENCE – NUCLEAR

Canadian Waste Management Office (NWMO) Deep Geologic Repository (DGR) Project Follow-up Monitoring
Kincardine, Ontario, Canada

Project manager and senior technical lead for multi-year follow-up wildlife and vegetation monitoring at the DGR site. The scope of work included SAR turtle visual encounter surveys (VES; also known as basking surveys), SAR snake emergence and egg-laying surveys, rare plant surveys, data comparisons between years of data collection, and reporting.

Canadian Nuclear Laboratories (CNL) Whiteshell Research and Development Complex Decommissioning EA
Pinawa, Manitoba, Canada

Natural environment component lead for a federal EA. Developed Valued Ecosystem Components (VEC) and pathways of effects assessment. Analysed existing conditions terrestrial and aquatic data for the regional, local and site study area including for SAR, provided recommendations for additional permitting and mitigation for potential effects to wildlife and sensitive habitats. Provided input to construction design and developed technical reports.
Natural environment component lead for a federal EA. Developed Valued Ecosystem Components (VEC) and pathways of effects assessment. Analysed existing conditions terrestrial and aquatic data for the regional, local and site study area including for SAR, provided recommendations for additional permitting and mitigation for potential effects to wildlife and sensitive habitats. Provided input to construction design and developed technical reports.

Canadian Nuclear Laboratories (CNL) Port Hope Remediation
Port Hope, Ontario, Canada

Natural environment component lead for permitting for remediation of Port Hope Harbour, Ganaraska River and other watercourses in Port Hope. Liased with the Ganaraska River Conservation Authority, MNRF, DFO, and Canadian Nuclear Safety Commission, completed pathways of effects assessment, impact assessment and prepared applications and obtaining permits for dredging, bank stabilization, sediment remediation, SAR, and removal and work on Crown lands.

Bruce Power Units 3&4 Restart
Kincardine, Ontario, Canada

Worked with a team to establish VEC and appropriate study areas. Coordinated field technicians and interpreted data on fish impingement, entrainment, fishing pressure and temperature and velocity effects on aquatic habitat and biota, including bass spawning surveys. Worked with a team of biologists to determine the potential for warm water discharges to affect waterfowl use of nearby areas, and evaluated effects on the white-tailed deer population due to vehicle strikes. Prepared technical reports.

Pickering Nuclear 'A' Return to Service Follow-up and Monitoring
Pickering, Ontario, Canada

Multi-year monitoring program. Coordinated aquatic field technicians and interpreted data on impingement, entrainment, fishing pressure, waterfowl surveys, and temperature and velocity effects on aquatic habitat and biota, including bass spawning surveys. Worked with a team of biologists to evaluate the effects of wildlife-vehicle interactions on nearby roadways on terrestrial biota populations. Prepared annual monitoring reports.

PROJECT EXPERIENCE – MINING

Alamos Island Gold, Mine Expansion Feasibility Study
Dubreuilville, Ontario, Canada

Senior advisor/technical reviewer for terrestrial and aquatic baseline studies for a feasibility study for a potential mine expansion. Studies included collection of baseline data and surveys for the following: fish and fish habitat, water quality, caribou, species at risk, breeding bird, marsh bird, waterfowl nesting and stopover, nightjar (eastern-whip-poor-will and common nighthawk) turtle, amphibian, bat habitat, moose late winter habitat, and significant wildlife habitat. Provided direction for the workplan and reviewed all draft and final deliverables.

Agnico Eagle Mines Limited, Upper Beaver Mine
Kirkland Lake, Ontario, Canada

Senior advisor/technical reviewer for terrestrial and aquatic components of a gap analysis and scoping study for environmental data required to support a potential federal impact assessment (IA) and federal agency approvals, including Species at Risk Act and Fisheries Act authorization. Oversight of review of historical studies and recommendation for future studies to support the IA and permitting. Reviewed all draft and final deliverables. Developed permitting roadmap and presented all project results to the client.

EWL Management Ltd. Dyno Mine Rehabilitation
Bancroft, Ontario, Canada

Natural environment component lead for an environmental and health risk assessment of decommissioned uranium mine. Worked with a multi-disciplinary team including surface water engineers, geotechnical engineers, and risk specialists. Designed and coordinated bioscience field technicians to carry out the natural environment workplan. Tasks included fish habitat assessment and characterization of the aquatic environment, and collection of benthic, fish, sediment and aquatic plant tissue samples in affected and reference lakes and watercourses in support of the human health and ecological risk assessment. In addition, collection of small mammal and plant tissue samples and characterization of wildlife habitat was included. Responsible for analysis and interpretation of data, as well as report preparation and liaising with stakeholders and government agencies.

EWL Management Ltd. Coldstream \ Mine Rehabilitation
Thunder Bay, Ontario, Canada

Natural environment component lead for an environmental and health risk assessment of a decommissioned copper mine. Worked with a multi-disciplinary team including surface water engineers, geotechnical engineers, and risk specialists. Designed and coordinated bioscience field technicians to carry out the natural environment work plan. Tasks included fish habitat assessment and characterization of the aquatic environment, and collection of benthic, fish, sediment and aquatic plant tissue samples in affected and reference lakes and watercourses in support of the human health and ecological risk assessment. In addition, collection of plant tissue samples and characterization of wildlife habitat was included. Responsible for analysis and interpretation of data, as well as report preparation and liaising with stakeholders and government agencies.

PROJECT EXPERIENCE – OIL & GAS

Enbridge Bayview Avenue Pipeline Replacement
Ontario, Canada

Natural environment component lead for pipeline replacement project. Coordinated SAR screening, natural heritage feature mapping, site investigations, impact assessment, tree inventory, DFO self-assessment, consultation with MECP, registration of activities (NoA) under the Endangered Species Act and development of mitigation plan. Worked with team to obtain Toronto and Region Conservation Authority (TRCA) permits.

Enbirdge Pipelines Inc. Line 9
Southern Ontario, Canada

Project manager for natural environment component of pipeline maintenance project in southern Ontario. Coordinated SAR screening and natural heritage feature mapping, site investigations, identification of permit requirements and constraint mapping in support of brushing and other maintenance activities.

TransCanada Bear Creek Rehabilitation Ontario, Canada	Natural environment component lead for Bear Creek rehabilitation following washout and exposure of the pipeline in the creek bed. Completed baseline existing conditions reporting including fish and fish habitat, SAR and riparian habitat to meet Conservation Authority, MNRF and DFO requirements. Worked with Golder's hydrology team to obtain Conservation Authority permits, develop a rehabilitation plan suitable for the existing conditions and fish community, and recommended appropriate mitigation during construction.
TransCanada Greater Golden Horseshoe Facilities Modifications Ontario, Canada	Natural environment component lead for an environmental and socio-economic assessment for modifications to a number of facilities under the National Energy Board (NEB). Responsibilities included designing the field program (vegetation, wetlands, wildlife, fish and fish habitat), analysing data, completing the baseline and effects assessment, liaising with agencies and permitting.
TransCanada Eastern Mainline Project Ontario, Canada	Vegetation and wetland component lead for an environmental and socio-economic assessment for a 392 km new construction pipeline in southern Ontario under the National Energy Board (NEB). Designed the field program, analysed data, completed the baseline and effects assessment and reporting. Consulted and negotiated with the MNRF, Environment and Climate Change Canada (ECCC) and local Conservation Authorities, prepared permit applications, and addressed Information Requests (IRs).
TransCanada Parkway West Connection Milton, Ontario, Canada	Natural environment component lead for an environmental and socio-economic assessment for a new pipeline connection under the NEB. Designed the field program (vegetation, wetlands, wildlife, fish and fish habitat), analysed data, completed the baseline and effects assessment, led consultation with agencies and obtained permits.
TransCanada Vaughan Mainline Extension Ontario, Canada	Senior technical reviewer and advisor for the vegetation, wetland and wildlife components for an environmental and socio-economic assessment for a new construction pipeline in southern Ontario under the NEB. Consulted with provincial and federal agencies, designed and coordinated baseline, construction and post-construction monitoring programs and developed environmental protection plans.
TransCanada Kings North Connection Ontario, Canada	Senior technical reviewer and advisor for the vegetation, wetland and wildlife components for an environmental and socio-economic assessment for a new construction pipeline in southern Ontario under the NEB. Consulted with provincial and federal agencies, designed compensation habitat for SAR, designed and coordinated baseline, construction and post-construction monitoring programs and developed environmental protection plans.
TransCanada LNG Facility Trois Rivieres, Quebec, Canada	Aquatic technical component lead. Designed and conducted inland fisheries field programs for a liquefied natural gas facility and associated distribution pipelines. The programs included aquatic habitat assessments of all watercourse pipeline crossings, and an assessment of habitat and water quality of inland lakes in the vicinity of the facility. Interpreted data and prepared technical reports.

PROFESSIONAL AFFILIATIONS

Professional Association of Diving Instructors (PADI)

Director, Ontario Stone Sand and Gravel Association (OSSGA) Board of Directors

PUBLICATIONS

Conference Proceedings

Melcher, Heather. 2021. *Public Engagement in the Time of COVID-19*. Ontario Stone Sand and Gravel Annual General Meeting and Conference, February. Online.

Melcher, Heather and Amber Sabourin. 2019. *The Use of Remote Sensing in Natural Environment Surveys*. Ontario Stone Sand and Gravel Association Annual General Meeting and Conference, February. Niagara Falls, Canada.

Melcher, Heather. 2015. *Bats and the Aggregate Industry*. Ontario Stone Sand and Gravel Association Annual General Meeting and Conference, February. Toronto, Canada.

Melcher, Heather. 2014. *Changes to the Ontario Endangered Species Act and Implications to the Aggregate Industry*. Ontario Stone Sand and Gravel Association Annual General Meeting and Conference, February. Ottawa, Canada.

Other

Melcher, Heather. 2001; 2002. Effects of Agricultural Inputs of Faecal Coliforms on the Shellfish Industry in Prince Edward Island. Annual Monitoring Report. Prince Edward Island.

Golder Associates Ltd. – Mississauga

Ecologist

Amber is an Ecologist and Project Manager with 10 years of experience in terrestrial ecology. She has skills in Ontario flora and fauna identification, wetland evaluations, species at risk (SAR) screenings, terrestrial habitat assessments and environmental impact assessments. Amber's experience lies in the design and management of terrestrial field programs, and project management for natural environment components of projects. Amber has experience working in numerous sectors, with a focus in the power, aggregate, oil and gas, land development and mining sectors. Amber also works extensively with the *Endangered Species Act* (ESA) and *Species at Risk Act* (SARA) and associated regulations, and leads Golder's internal Species at Risk Working Group. She has led numerous field programs to support permitting under the ESA and the compilation of terrestrial baseline reports. Her field experience includes completing assessments for significant wildlife habitat, Ecological Land Classification (ELC), wetland delineation and evaluations, herpetofaunal surveys, butternut health assessments, botanical inventories, and bat surveys.

Education

HBSc (Env) Honours Environmental Biology Co-op, University of Guelph, Guelph, Ontario, 2012

Certifications

Ecological Land Classification for southern Ontario (Ministry of Natural Resources and Forestry), 2014

Ontario Wetland Evaluation System (Ministry of Natural Resources and Forestry), 2017

WHMIS, 2017

Federal Reliability Clearance, 2018

First Aid and CPR Level C, 2019

Butternut Health Assessor (Ministry of Natural Resources and Forestry), 2019

Languages

English – Fluent

Employment History

Golder Associates Ltd. – Mississauga, Ontario
Ecologist (2012 to Present)

Responsibilities include project management, field data collection and analysis, and preparation of environmental assessment reports, screening reports, and natural environment reports for private and public sectors. Development, implementation and coordination of field programs, coordination and management of project budgets for natural environment teams, and management of an internal Species at Risk Grouping Work.

City of Guelph – Guelph, Ontario
Conservation and Efficiency Program Assist (Co-op) (September 2009 to December 2009)

Responsible for monitoring an information line related to two City rebate programs and verifying applications. Conducted presentations in the Upper Grand District School Board to educate students on water conservation and protection through interactive learning. Participated in a pilot program monitoring the water quality of residential grey water systems, including water sampling, analysis, tracking of results, and compilation of a report for the City.

Environment Canada - Canadian Wildlife Service – Burlington, Ontario
Wildlife Toxicology Technician (Co-op) (January 2009 to April 2009)

Independently managed a study exposing tadpoles of the African clawed frog to treated wastewater effluent from the Hamilton Sewage Treatment Plant in a flow-through facility, including animal care, experimental procedure and endpoint measurements. Performed field collection of European starling eggs for use in environmental toxicology monitoring program.

PROJECT EXPERIENCE – CONSTRUCTION MATERIALS

CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Dance Pit Extension North Dumfries, Ontario, Canada	Natural Environment Component Lead for an above-water pit licence application under the Aggregate Resources Act. Responsibilities included coordinating field data collection and analysis, interpreting data in cooperation with other disciplines, and preparing Level I & II Natural Environment Technical Report.
CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Lanci Pit Expansion Aberfoyle, Ontario, Canada	Natural Environment Component Lead for a below-water pit licence application under the Aggregate Resources Act. Responsibilities included coordinating field data collection and analysis, interpreting data in collaboration with other disciplines as part of the impact assessment, and preparing the Level 1 and 2 Natural Environment Technical Report for submission to the Ministry of Natural Resources and Forestry.
CBM Aggregates (a division of St. Marys Cement Inc. (Canada)), Ayr/Bromberg Pit Monitoring Ayr, Ontario, Canada	Project Manager for two monitoring programs (butternut health and tree survivability) at two adjacent operational pits. Responsibilities included field data collection and analysis, including butternut health assessments, and preparing monitoring reports in accordance with monitoring requirements set out in the Site Plan.
Queenston Quarry Reclamation Company, Queenston Quarry Redevelopment Project Niagara-on-the-Lake, Ontario, Canada	Project Manager for proposed re-development of the 100 ha former Queenston Quarry. Responsibilities included coordinating field data collection and analysis, interpreting data, and preparing an Environmental Impact Study report for submission to the Niagara Escarpment Commission. Responsible for negotiations and discussions with the Ministry of Natural Resources and Forestry regarding species at risk and development of mitigation measures.
EWL Management Ltd., Northern Ontario Quarry and Pit Project Northern Ontario, Canada	Managed, coordinated and led the terrestrial field program to conduct eastern whip-poor-will, anuran call count, and acoustic bat monitoring surveys for a proposed borrow area and quarry site. Worked with a multi-disciplinary team to collect and analyze field data for preparation of the Level 1 and 2 Natural Environment Technical Reports as part of two licence applications under the Aggregate Resources Act. Worked with the client and Ministry of Natural Resources and Forestry to develop mitigation and compensation plans for species at risk, including woodland caribou and bats.
Scotian Materials, Goffs Quarry Expansion Environmental Assessment Halifax, Nova Scotia, Canada	Conducted natural heritage studies for a proposed quarry expansion project, including preparation of an Environmental Impact Study report as part of the Environmental Assessment Registration Document. Conducted field surveys, including botanical inventory and plant community classification using the Forest Ecosystem Classification system for Nova Scotia, rapid fish habitat assessments, wildlife and SAR habitat assessments, and wetland surveys in accordance with the Nova Scotia Wetland Evaluation Technique.

Colacem, Cement Plant
L'Orignal, Ontario, Canada

Prepared an Environmental Impact Statement for the municipal approval process for the proposed construction of a cement plant. Responsibilities included coordinating field data collection, analysis and interpretation of data, and preparation of the Environmental Impact Statement report. Also prepared and submitted a Request for Project Review to Fisheries and Oceans Canada for impacts to fish habitat.

Lafarge Canada Inc., Sunningdale Pit
London, Ontario, Canada

Prepared the Level I & II Natural Environment Technical Report to accompany the licence application for aggregate extraction under the provincial Aggregate Resources Act. Project Manager for annual monitoring of barn swallow compensation structures installed as part of the Notice of Activity under the ESA for the project. Project management responsibilities involved coordination of field surveys to assess use of the structures, preparation of a mitigation plan, and preparation of annual monitoring reports.

Lafarge Canada Inc., Limebeer Pit
Caledon, Ontario, Canada

Performed anuran call count and egg mass surveys, as well as turtle nesting surveys, to accompany a proposed aggregate licence under the Aggregate Resources Act. Prepared the Level I & II Natural Environment Technical report as part of the successful licence application.

Lafarge Canada Inc., Avening Extension Pit
Creemore, Ontario, Canada

Performed anuran call count surveys and egg mass searches as part of a proposed expansion to a currently licenced and operating aggregate pit. Prepared the Level I & II Natural Environment Technical report to support the licence expansion application. Also prepared and submitted permitting documents, including a DFO Request for Project Review under the Fisheries Act, and a Notice of Activity under the ESA.

PROJECT EXPERIENCE – ENVIRONMENTAL ASSESSMENT

HydroOne Networks Inc., B5C/B6C Line Refurbishment Project
Burlington, Ontario, Canada

Coordinated and led terrestrial field surveys to support the Environmental Assessment for a 24 km stretch of hydro corridor proposed for refurbishments. Completed vegetation community assessment and mapping, botanical inventory, species at risk surveys and wildlife habitat assessments in cooperation with First Nations. Also conducted a rare plant survey and mapping for a target species (New Jersey Tea).

Marten Falls Community Access Road
Marten Falls, Ontario, Canada

Vegetation component lead for a coordinated provincial and federal impact assessment of the proposed all-season community access road to the Marten Falls First Nation community in northern Ontario. Responsibilities include coordination of desktop vegetation community mapping, preparation of a field study plan, coordination of field surveys in remote areas in cooperation with other technical disciplines, analysis and interpretation of data, completion of a detailed impact assessment and reporting.

City of Cambridge Zone 3 Project
Cambridge, Ontario, Canada

Natural Environment Component Lead for a municipal class Environmental Assessment related to the Regional Water System Upgrades in Cambridge and North Dumfries. Responsibilities included coordination of baseline field data collection, data analysis and interpretation, and preparation of a Natural Heritage Report for 15 short-list alternative sites.

Brantford Three Grand River Crossings Brantford, Ontario, Canada	Natural Environment Component Lead for a municipal class Environmental Assessment related to the rehabilitation of three bridges crossing the Grand River. Completed vegetation community assessment and mapping, botanical inventory, and species at risk and wildlife habitat assessments within the study area. Also compiled a baseline natural environment report including constraints analysis, recommendations for the preliminary design, and an assessment of permitting requirements.
Town of Clarksburg Master Servicing Plan Clarksburg, Ontario, Canada	Natural Environment Component Lead for a Class Environmental Assessment of a water and wastewater master servicing plan. Responsibilities included coordination of terrestrial data collection, analysis and interpretation of data, and preparation of the Natural Environment Report.
Town of Blue Mountains Water Supply Master Plan Blue Mountains, Ontario, Canada	Natural Environment Component Lead for a Schedule B Municipal Class Environmental Assessment for a water supply master plan for the Town of Blue Mountains planning area. Responsibilities included coordination and implementation of the terrestrial field program, analysis and interpretation of data, and preparation of an Environmental Impact Study report.
City of Markham Victoria Square Blvd Improvements Markham, Ontario, Canada	Natural Environment Component Lead for a Schedule C Class Environmental Assessment related to planned road improvements. Responsibilities included coordination and collection of field data, analysis and interpretation of data, and preparation of the Natural Environment Report.
Tlicho All-Weather Road Project Northwest Territories, Canada	Completed the baseline description and effects assessment for wildlife Valued Components as part of the Adequacy Statement Response for the Environmental Assessment of a proposed 94 km all-season road. Also provided responses to agency and stakeholder Information Requests as part of the review of the Environmental Assessment.
City of Cambridge Zone 1W Project Cambridge, Ontario, Canada	Project manager for a Class B Environmental Assessment for the Cambridge Pressure Zone 1W project. Responsibilities included coordination of field data collection, data analysis and interpretation, and preparation of a Natural Environment Report.
Region of Peel – East to West Wastewater Diversion Strategy Project Mississauga, Ontario, Canada	Natural Environment Component Lead for a municipal class Environmental Assessment. Responsibilities included coordination of terrestrial data collection, analysis and interpretation of data, and preparation of the Natural Environment Report.

PROJECT EXPERIENCE – ECOLOGY

CIMA, Consumer's Drive Extension Whitby, Ontario, Canada	Conducted a wetland evaluation using the Ontario Wetland Evaluation System (OWES) to evaluate the potential for a wetland on site to be complexed with a nearby existing Provincially Significant Wetland. Terrestrial communities on the site were also delineated and classified according to the ELC system for southern Ontario. Prepared the wetland evaluation report for submission to the Ministry of Natural Resources and Forestry.

Wetland Evaluation
Belleville, Ontario, Canada

Project manager for a wetland evaluation project on a proposed subdivision development site. Conducted a wetland evaluation using OWES to evaluate the potential for four wetland units to be complexed with an adjacent Provincially Significant Wetland. Prepared the wetland evaluation report for submission to the Ministry of Natural Resources and Forestry resulting in agency approval of the complexing recommendations. Also responsible for consultation with Lower Trent Conservation to develop appropriate mitigation measures for the development.

Emery / Metrus, Levi Creek Constructed Wetland Monitoring
Mississauga, Ontario, Canada

Conducted post-construction environmental monitoring of a constructed wetland adjacent to residential development. Monitoring was conducted for both terrestrial and wetland components, and included anuran surveys, vegetation plot monitoring following the Credit Valley Conservation (CVC) vegetation plot technique guidelines, and qualitative wildlife habitat assessments. Prepared the monitoring report for submission to CVC and Fisheries and Oceans Canada.

Scoped Subwatershed Study
Central Elgin, Ontario, Canada

Conducted a natural heritage assessment as part of a scoped subwatershed study in the Lower Kettle Creek subwatershed with the objective to provide a framework to guide future land use and development. Completed field surveys, including mapping of ELC communities, wildlife and SAR habitat assessments, and rapid watercourse and fish habitat assessments. Prepared the natural heritage sections of the scoped subwatershed study report, including provision of recommendations on environmental targets and management strategies.

Ecological Risk Assessment
Nobel, Ontario, Canada

Natural Environment Component Lead for an ecological risk assessment comparing wildlife communities on a former industrial site to a reference site to help analyse potential development options and develop ecological risk-management measures for the site. Responsibilities included design and implementation of the field study program, analysis of data using the Jaccard Index to evaluate community similarity, and preparation of the ecological assessment report.

Serafina Energy Ltd. Meota West 2 Project
Meota, Saskatchewan, Canada

Crew lead for wetland habitat classification (in accordance with Stewart and Kantrud 1971) and rare vascular plant survey (in accordance with the government of Saskatchewan Species Detection Survey Protocol) as part of baseline environmental surveys for a steam-assisted gravity drainage project. Responsibilities included schedule management, daily logistics planning, summary reporting and data management.

PROJECT EXPERIENCE – SPECIES AT RISK

American Ginseng Monitoring Program
Simcoe County, Ontario, Canada

Project Manager for the annual monitoring program of American ginseng (designated endangered under the ESA) which is required as part of an ESA permit since 2015. Responsibilities included implementation of population surveys of the American ginseng reserve, analysis and interpretation of field data in order to evaluate the health of the reserve, and coordination of annual reporting for submission to the Ministry of Natural Resources and Forestry / Ministry of Environment, Conservation and Parks.

TC Energy, Pipeline Integrity Program Various Locations, Ontario, Canada	Project Manager for the TC Energy Eastern Region (Ontario) pipeline integrity program since 2016. Responsibilities include coordination and management of desktop natural environment and SAR screenings, liaising with the local Conservation Authority to identify and obtain permits, and coordination of SAR and avian nesting surveys across Ontario as part of pipeline maintenance activities.
Cameco Corporation, Species at Risk Surveys Port Hope, Ontario, Canada	Natural Environment Component Lead for SAR surveys at the Port Hope Conversion Facility. Responsibilities included coordination and management of desktop assessments and species-specific field surveys to identify and evaluate use of SAR habitat in proposed work areas, recommend mitigation measures and provide advice on necessary permits or authorizations required to complete the proposed work.
Canadian Nuclear Laboratories (CNL) Port Hope Remediation Port Hope, Ontario, Canada	Responsible for coordinating SAR screenings and field surveys to verify existing habitat conditions and assess the presence of potential SAR habitat in areas proposed for remediation. Provided recommendations related to mitigation measures, species-specific surveys to confirm habitat use, and permitting requirements under the ESA and/or SARA.
Municipality of Chatham-Kent, Ontario Certified Site Ready Program Chatham, Ontario, Canada	Natural Environment Component Lead for an “Investment Ready” property designation under the Ontario Certified Site Ready Program. Responsibilities include coordination and completion of SAR screenings and field assessments for two properties as part of the program designation process. Also prepared a report identifying potential SAR-related constraints for future development opportunities.
Commercial Development Township of Amaranth, Ontario, Canada	Conducted Butternut Health Assessments on 15 butternut trees and prepared the Butternut Health Assessment Report for submission to the Ministry of Environment, Conservation and Parks.
Chimney Swift Registration and Monitoring Program Mississauga, Ontario, Canada	Project Manager for a chimney reconstruction project requiring registration under the ESA for alterations to chimney swift habitat. Responsibilities included consultation with the Ministry of Natural Resources and Forestry, preparation and submission of a Notice of Activity form, and preparation and implementation of a Mitigation Plan including annual monitoring and reporting.
Digram Developments Caledon Inc., Barn Swallow Monitoring Caledon, Ontario, Canada	Coordinated and managed an annual barn swallow monitoring program of barn swallow compensation structures at a land development site in Caledon. Also prepared the mitigation plan and annual monitoring reports required as part of the Notice of Activity registration process under the ESA.

PROJECT EXPERIENCE – TRANSPORTATION/RAIL

HDR Inc., Downtown Rapid Transit Expansion Study
Toronto, Ontario, Canada

Prepared the natural environment component of the Environmental Project Report as part of a Transit Project Assessment Process Environmental Assessment for the Downtown Relief Line project. Responsibilities included characterization and evaluation of existing conditions, identification of impacts and recommendation of mitigation and contingency measures. Coordinated and developed responses to agency and stakeholder comments related to natural environment in the Environmental Project Report.

Markham GO Station Road Realignment, Transit Project Environmental Assessment
Markham, Ontario, Canada

Prepared a Natural Environment Report, including detailed impact assessment, as part of a Transit Project Assessment Process for proposed improvements and road alignment associated with the Markham GO station.

Canadian National Railway Company, Credit River Bridge Replacement Post-Construction Monitoring
Georgetown, Ontario, Canada

Completed Year 1 and 2 of the post-construction vegetation monitoring program associated with restoration of the Credit River Valley following a railway bridge replacement. Prepared the monitoring report for submission to the Credit Valley Conservation Authority and Fisheries and Oceans Canada.

Canadian National Railway Company, Desktop Assessments
Northern Ontario, Canada

Conducted desktop environmental evaluation reports for siding extensions at six remote sites in northern Ontario. Each evaluation included a desktop level constraints analysis for SAR, designated natural areas, terrestrial features, wildlife habitat, aquatic features and fish habitat. The environmental evaluation report summarized each potential environmental constraint and identified applicable mitigation measures.

PROJECT EXPERIENCE – OIL & GAS

TransCanada Pipelines, Eastern Mainline Project
Ontario, Canada

Coordinated and led the terrestrial field program for baseline data collection to accompany the National Energy Board filing for twining of 245 km of pipeline between Whitby and Brockville. Responsibilities included desktop selection of field survey locations for both vegetation and wildlife components, field logistics and access planning, preparation of specific work instructions (SWI) and implementation of the field program. Collaborated with a multi-disciplinary team to prepare the Environmental and Socio-economic Assessment report and led the vegetation and wildlife effects assessment. Also designed, coordinated and implemented the terrestrial SAR field program, targeting amphibians, birds and reptiles, along the proposed route in support of SAR permitting. Also worked in cooperation with First Nations to conduct field surveys.

Canadian National Resources Limited, Cold Lake Oil Response Project
Cold Lake, Alberta, Canada

Conducted wildlife inventory, monitoring and determent activities as part of the response to a bitumen release in northern Alberta. Activities included amphibian pit-fall trapping and release, construction monitoring and mitigation, waterfowl trapping, bird surveys, and preparation of daily monitoring reports.

Syncrude Canada, Beaver Creek Monitoring Program
Fort McMurray, Alberta, Canada

Prepared the annual water report summarizing the results of surface water quality and toxicity testing conducted in Beaver Creek downstream of the Mildred Lake Settling Basin between 2012-2014. Performed analysis and interpretation of trends in water quality data collected over two to three sampling periods each year.

PROJECT EXPERIENCE – MINING

Cliffs Chromite Project
James Bay Lowlands, Ontario, Canada

Conducted Northeastern Ontario Forest Ecosystem Classification surveys in remote locations to facilitate evaluation of transportation corridor alternatives for proposed mining project. Also prepared Natural Environment Level 1 reports under the *Aggregate Resources Act* for numerous pits and quarries proposed as part of the Integrated Transportation System connecting the Black Thor Mine site to highways in the south.

Osisko, Hammond Reef Gold Project
Atikokan, Ontario, Canada

Completed baseline data collection as part of the terrestrial field program to support the Environmental and Social Impact Assessment (ESIA) for a proposed gold mine. Surveys included avian, turtle and anuran surveys, surveys to identify and delineate potential areas of wild rice colonies, as well as toxicological sampling of local vascular plant species and soil. Collaborated with a multi-disciplinary team to prepare the terrestrial baseline report and provide input into the ESIA report.

PROJECT EXPERIENCE – WASTE

Simcoe County Landfill Closures
Simcoe County, Ontario, Canada

Provided natural environment services for various landfill closure sites across Simcoe County, including preparation and submission of scoped Environmental Impact Studies and restoration plans. Also engaged in consultation with the Nottawasaga Valley Conservation Authority to determine the Terms of Reference, permitting requirements and restoration requirements, and attended a site visit with the conservation authority to delineate the wetland boundary.

Humberstone Landfill
Niagara, Ontario, Canada

Planned and coordinated a bat habitat assessment including snag density calculations as part of proposed infrastructure upgrades. Also directed preparation of Awareness Plans for SAR, including identification traits, actions to take if encountered and recommendations for mitigation measures to avoid adverse impacts.

PROJECT EXPERIENCE – POWER

NWMO / OPG Deep Geologic Repository Ecological Surveys Tiverton, Ontario, Canada	Implemented an ecological survey program for the proposed Low and Intermediate Level Waste Deep Geologic Repository Project on the Bruce Power site. Responsibilities included field planning and implementation of an existing survey program, collection of high-quality environmental field data and compilation of annual reports. Conducted targeted field surveys including rare plant survey, turtle visual encounter surveys, and snake visual encounter surveys throughout the 35 ha study area.
OPG Salt Storage Building Darlington, Ontario, Canada	Natural Environment Component Lead for proposed salt and transport work equipment storage buildings on the Darlington Nuclear Generating property. Prepared a natural environment and SAR screening report as part of the permit application package for the Central Lake Ontario Conservation Authority.
OPG Darlington Nuclear Power Plant Darlington, Ontario, Canada	Natural Environment Component Lead providing services such as Environmental Impact Study, SAR Screenings, for several Projects related to the Darlington New Nuclear Plant requiring
Hydro One Networks Inc., Environmental Monitoring Plan Timmins, Ontario, Canada	Developed an Environmental Monitoring Plan and Checklist to support planned construction activities along an existing transmission corridor from Timmins to Shining Tree. Provided recommendations for best management practices and mitigation measures to avoid or minimize damage to natural features, including species at risk, wetlands and waterbodies. Also designed a checklist for daily on-site use by the Environmental Inspector as a compliance tool to ensure activities align with the Environmental Monitoring Plan.
NextEra Canada Battery Energy Storage Facility Elmira, Ontario, Canada	Conducted the Natural Heritage Assessment to support permitting for the proposed Solid Battery Energy Storage Systems project in Elmira, including a SAR screening, site reconnaissance, preparation of a constraints analysis and identification of permit requirements under the ESA and Conservation Authorities Act.
Disco Road Organics Processing Facility Toronto, Ontario, Canada	Prepared the Records Review and Site Investigation reports to support the natural heritage portion of a Renewable Energy Approval.
Majestic and Mayer Wind Energy Project Bruce County, Ontario, Canada	Prepared updates to the Records Review, Site Investigation, Evaluation of Significance, and Environmental Effects Monitoring Plan reports to support the natural heritage portion of a Renewable Energy Approval.
Churchill Wind Energy Project Lambton County, Ontario, Canada	Performed site investigations of overall natural heritage, including ELC and habitat mapping, and bat maternity roost surveys, to support Natural Heritage Assessment portion of Renewable Energy Approval for proposed wind project.
Clarington Wind Energy Project Clarington, Ontario, Canada	Performed evening bat acoustic monitoring surveys to identify bat maternity roosts as part of the Natural Heritage Assessment portion of Renewable Energy Approval for proposed wind project.

Arran Wind Farm Project County of Bruce, Ontario, Canada	Performed site investigations of overall natural heritage, including ELC and habitat mapping, and bat maternity roost surveys, to support Natural Heritage Assessment portion of Renewable Energy Approval for proposed wind project.
Twenty-Two Degrees Wind Farm Project County of Huron, Ontario, Canada	Performed site investigations of overall natural heritage, including ELC and habitat mapping, and bat maternity roost surveys, to support Natural Heritage Assessment portion of Renewable Energy Approval for proposed wind project.
Camlachie Wind Farm Project Camlachie, Ontario, Canada	Conducted site investigations of overall natural heritage to support the natural heritage portion of a Renewable Energy Approval, including wildlife habitat identification, vegetation and habitat mapping, and bat maternity roosting and acoustic surveys.
Armow Wind Farm Project Bruce County, Ontario, Canada	Performed site investigations of overall natural heritage to support the natural heritage portion of a Renewable Energy Approval, including wildlife habitat identification, vegetation and habitat mapping, and bat maternity roosting and acoustic surveys.
Summerhaven Wind Farm Project Haldimand County, Ontario, Canada	Performed site investigations as part of natural heritage assessments to support a Renewable Energy Approval for proposed wind project. Site investigations included wildlife habitat identification, vegetation and habitat mapping, and bat maternity roosting and acoustic surveys.

PROJECT EXPERIENCE – LAND DEVELOPMENT

Hopewell Developments Inc., Matheson Boulevard Commercial Development Mississauga, Ontario, Canada	Project Manager for a commercial development site adjacent to Little Etobicoke Creek. Conducted a desktop assessment of existing environmental features, assessed potential impacts, and prepared an Environmental Impact Study report. Also identified mitigation measures and provided input into the planting plan for a buffer required by the Toronto and Region Conservation Authority.
Biddle and Associates Ltd., Northglen Residential Subdivision Development Clarington, Ontario, Canada	Natural Environment Component Lead on a dewatering monitoring program at a residential subdivision development in compliance with a Permit to Take Water. Responsibilities included designing, coordinating and managing a wetland vegetation monitoring program for a swamp adjacent to the development. Interpreted data and prepared a baseline report and subsequent monitoring reports during the dewatering phase.
Residential Development Township of Springwater, Ontario, Canada	Project Manager and Natural Environment Component Lead for an Environmental Impact Study of a single-residence development. Responsibilities included coordinating aquatic and terrestrial field data collection and analysis, conducting ELC, wildlife habitat and botanical inventory surveys, interpreting data, and producing an Environmental Impact Study report for the township and conservation authority.

Residential Development
Flamborough, Ontario, Canada

Project Manager for an Environmental Impact Study for proposed residential development. Responsibilities included preparing a Terms of Reference, agency consultation, coordinating and implementing field data collection and analysis, conducting ELC, botanical inventory and amphibian call count surveys, interpreting data, as well as producing an Environmental Impact Study report for the municipality and conservation authority.

New Horizon Development Group Wedgewood Community Development
Burlington, Ontario, Canada

Conducted field surveys and prepared the Environmental Impact Study for a proposed mixed residential / commercial development of a golf centre on the Niagara Escarpment. Also attended a site visit with representatives of several agencies, including municipal government and conservation authority, to stake woodland dripline and top of bank boundaries and discuss the findings of the report.

Residential Development
Nobleton, Ontario, Canada

Project Manager and Natural Environment Component Lead for an Environmental Impact Study of single-residence development. Responsibilities included coordinating aquatic and terrestrial field data collection and analysis, interpreting data, attending agency meetings, as well as producing an Environmental Impact Study report for the municipality and conservation authority.

TRAINING

Surface Miner Training
2012

Argo Safe Operation Course
2012

Defensive Driver Training
Canadian Pro Drivers, 2015

Rail Safe
2019

PROFESSIONAL AFFILIATIONS

Ontario Stone Sand and Gravel Association Ecology Committee

PUBLICATIONS

Conference Proceedings

Melcher, Heather and Amber Sabourin. 2019. *The Use of Remotely Piloted Aircraft Images in Natural Environment Studies for ARA Licensing*. Ontario Stone Sand and Gravel Association Annual General Meeting, February. Niagara Falls, Canada.

Sabourin, Amber. 2020. *The Use of Remotely Piloted Aircraft Images in Natural Environment Studies*. Golder Technical Excellence Conference, February. Vancouver, British Columbia, Canada.

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